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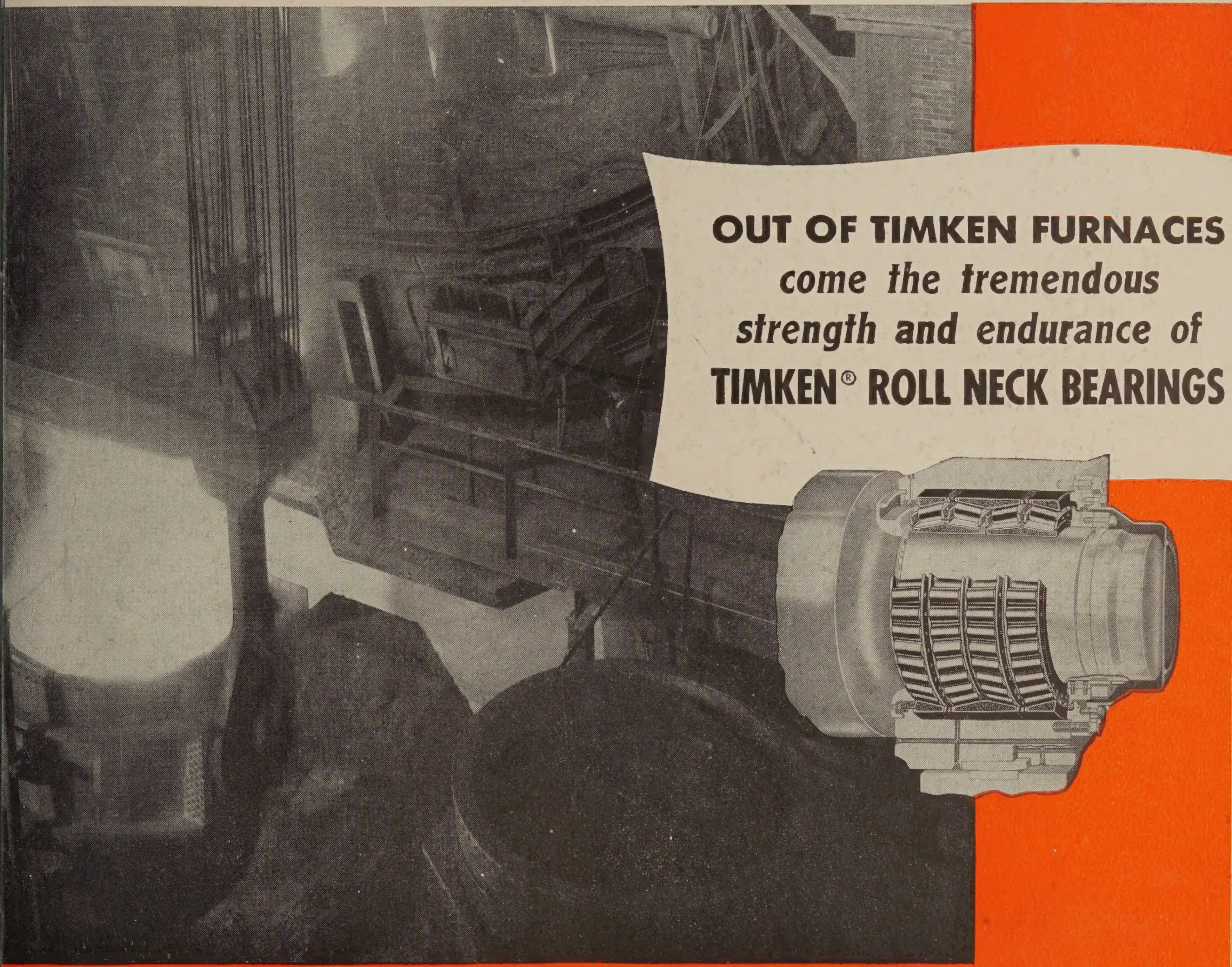
The
IRON AGE

AUGUST 12, 1948



Every pound of steel that goes into Timken roll neck bearings is melted in Timken steel furnaces.

Made to a modified Krupp formula developed in our metallurgical laboratories, this fine alloy steel is the ideal material for its job. It is largely responsible for the unequalled performance of Timken bearings in rolling millions of tons of steel at the lowest cost per ton ever recorded.

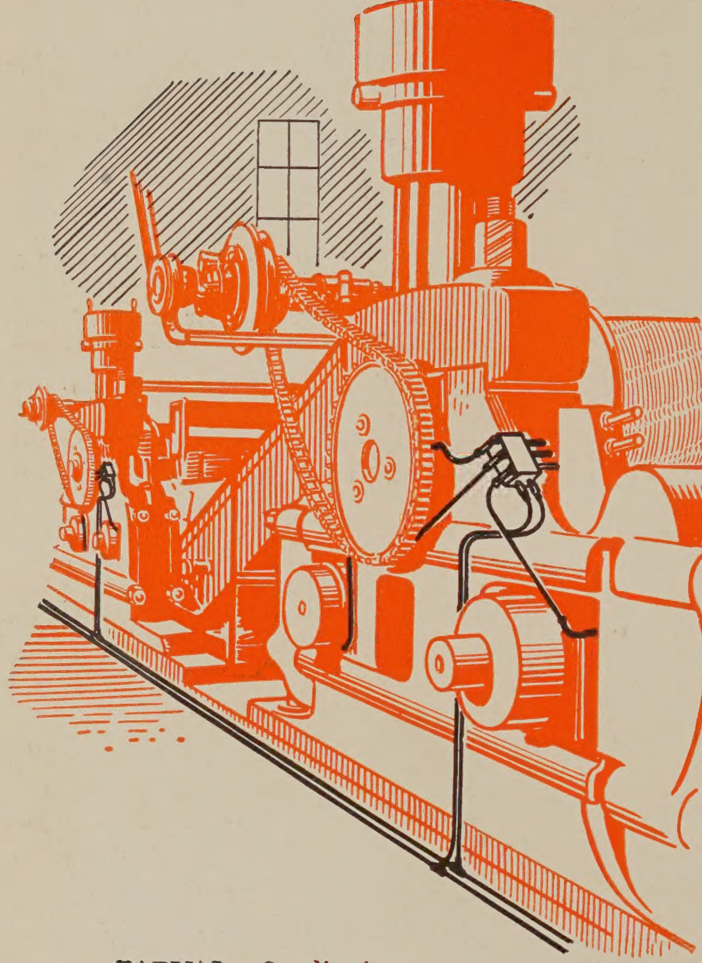
This steel, plus Timken balanced proportion design, has kept Timken roll neck bearings well ahead of advanced developments in rolling mills themselves. Thus Timken balanced proportion bearings made of Timken special alloy steel show load ratings up to 40% higher than formerly; they also possess 50% to 60% greater neck strength, resulting in greater mill and bearing rigidity and thereby higher rolling precision.

For further information consult your mill builder or our engineers. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address, "Timrosco".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROLL NECK BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ↓ AND THRUST →← LOADS OR ANY COMBINATION

Labor and lubricant saving quickly pays for Farval on sugar mill tandems



FARVAL—*Studies in Centralized Lubrication*
No. 105

SUGAR mill lubrication by hand is expensive and unsatisfactory. Roll bearings operate under pressures up to 5,000 p.s.i., and when neglected they heat up quickly. Because the mills must operate continuously, day and night, delays due to hot bearings are a serious problem. The oilers try to avoid shutdowns by literally flooding these bearings with oil.

To eliminate the hit-and-miss hazards of hand oiling and keep bearings well lubricated and cool, mill operators are installing Farval Centralized Lubricating Systems. On one sugar mill tandem, for example, a Farval system has reduced oil consumption to only 3 gallons per 24 hours—netting a saving of $660 for the grinding season on oil alone.

Farval also saves labor. At one Puerto Rican mill, where 3 men were employed to oil a tandem by hand, now only one man is required to supervise lubrication with Farval. At another plant operating a large tandem, no oiler is needed. In short, the money saved on labor and oil alone in one grinding season paid the entire cost of a Farval installation.

In addition to the elimination of hot bearings and mill delays, proper lubrication with Farval helps to maintain correct alignment of rolls, which guarantees maximum juice yield from the cane.

Farval delivers oil or grease under pressure to a group of bearings from one central station, in exact quantities, as often as desired. It does its work while the equipment is in operation. Farval is the Dualine System with the Positive Piston Displacement Valve. This valve has but two moving parts and is fully adjustable, with a Tell-tale indicator at each bearing to show the job is done.

Write for Bulletin 25 for a full description of Farval. The Farval Corporation, 3252 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.

FARVAL

CENTRALIZED SYSTEMS OF LUBRICATION

THE IRON AGE, published every Thursday by the CHILTON CO. (INC), Chestnut and 56th Sts., Philadelphia 39, Pa
Entered as second class matter Nov. 8, 1932, at the Post Office at Philadelphia under act of March 3, 1879.

. then you
ld a pinch
thyme

There's an element of art in every business. The skills of the steel craft, shared and advanced through neighborly cooperation, have brought Barium customers the best possible steel and steel products.

Consider the advantages of Barium's coordinated facilities for melting, rolling, casting, forging, stamping, machining and fabricating the steel used in your products. All of us in the Barium corporate neighborhood are ready to do our part in the often complex job of procuring and processing the steel you specify.

Get acquainted with the Barium subsidiary which can best advise you on your problems and supply your needs.

WE MELT, ROLL, CAST, FORGE, STAMP, MACHINE AND FABRICATE STEEL

ONE OF THE 16 BARIUM GOOD NEIGHBORS

HE GEOMETRIC STAMPING COMPANY
EVELAND, OHIO
sidiary of Barium Steel Corporation

Leading producer of medium and heavy metal stampings and assemblies. Geometric craftsmanship has served stamping users for over 30 years. Large modern plant has presses of 40 to 450 ton capacity . . . complete facilities in metal fabrication and welding . . . tool and die design and construction . . . engineering and redesigning.

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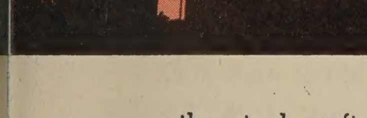

Anaconda
PHOSPHOR BRONZE

Complete range of alloys

IN SHEETS
PLATES, STRIPS,
WIRE, RODS, BARS,
SEAMLESS TUBES &
SPECIAL SHAPES

The American Brass Company offers Anaconda Phosphor Bronze in 10 standard compositions (including a free-cutting alloy) with tin content ranging from 1.25 percent to 10.5 percent.

Tell us what you make and how it's used. Our Technical Department is at your service in helping you select the correct alloy, the most serviceable temper, the most economical form. 48269

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HIGH
TENSILE STRENGTH
ELASTIC LIMIT
RESISTANCE TO FATIGUE
RESISTANCE TO CORROSION
RESISTANCE TO WEAR

Fatigue Cracks

BY C. T. POST

Inspissating

• • Pucker your lips, take a deep breath, and hiss politely like Tokyo Tommy. The word is *inspissating.*

James M. Williams, an old crossword puzzle fan, knew right away that *insippisating* would never fit, even in describing British foundry practice.

Delco-Remy's D.A. Cotton says positively that insippisating does not exist, inspissating the plot further.

And Rosamond Cruikshank lends the weight of the Portsmouth Navy Yard's Funk & Wagnalls dictionary, probably an extra thick edition, to verifying the inspissating effect of various oxides formed when the melt is held too long at high temperatures.

These loyal readers of your f.f.j. will make James L. Erickson, who described British practice in "Permanent Mold Casting of Copper Base Alloys" in the July 22 issue very happy. Mr. Erickson, you will recall (FATIGUE CRACKS, July 15), had fallen in love with insippisating. He'd carefully slipped it into his manuscript only to be scared away by a cold glint in the eye of the Brains Department's Bill Phair. Bill was in no mood to become father-in-law to a word unlisted by any available lexicon.

Now Author Erickson can walk hand-in-hand through life with inspissating, assuming he doesn't mind his S-curves in a little different place. It's only a pity he wasn't introduced in time to scare the melters who tend to hold the melt too hot too long. The word would burn through their spissus heads in an instant.

The meaning? Inspissating, according to Williams, Cotton, Cruikshank, Webster, and Funk & Wagnalls, merely means thickening . . . a gauche word no one could fall in love with.

In A Name

• • Common words have a certain sweet simplicity about them, as homey as rice pudding, that endears them to the men who work with them. But, as raisins and rum sauce touch off rice pudding, the epicures of erudition like to sweeten their prose with a real tongue tickler.

We've always felt very much the same way about family names. Some of our best friends are named Jones, and we'd like them not one whit better—probably less—if they did switch to Concklethorpe-Twittingham. But the Joneses usually are great ones for complaining.

One Jones, an old family friend, made no secret of his chagrin at fate handing him such a tag.

A new acquaintance attempted to console him. "What," it was suggested, "if you had a name that was actually repugnant, like . . . Coffin, for instance?"

Jones sighed. "That," he explained, "hapens to be my middle name."

The Old Days

• • Some of the loyal readers who have a drag with the historians could do your favorite family journal a great service. Get them to stop referring to that historic period, the "Iron Age." After giving our daughter's Grade 4 history a quick once over, something streamlined like the Rampage might seem to express the spirit of the times.

After failing in their efforts to drive into the heads of the popular press that there is only one authentic Iron Age (founded 1855 and still going strong, thank you) the boys down the hall have come to us in desperation. The latest clipping to be waved in our face carries this headline, just to give you an idea:

IRON AGE MAN'S
'OLD LOOK' MEANT
COAT, NO PANTS

With inflation closing its jaws on the seat of our britches, it may come to that yet.

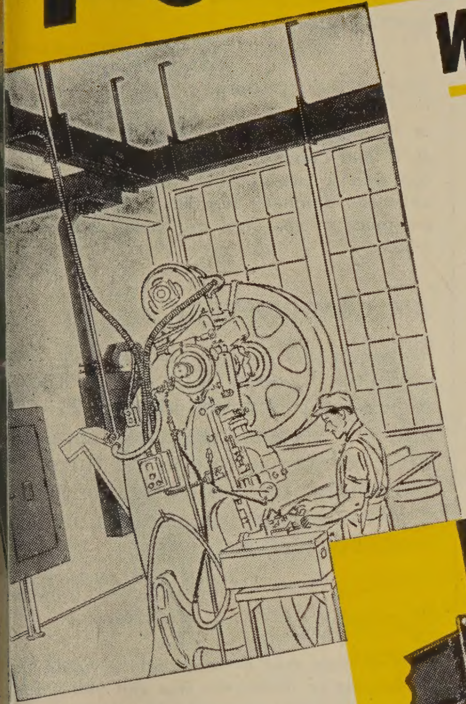
Tough Life

• • Remember our report on Clem Caditz, the steel-stalking genius of Chicago's Northern Metal Products Co., who haphazardly welded together a collection of spare parts into what might be charitably called an abstraction, and sent it off to his steel suppliers with a note implying that his thought processes were near the yield point because of the steel shortage? As we mentioned, some of the suppliers took pity and sent over a truck load or two.

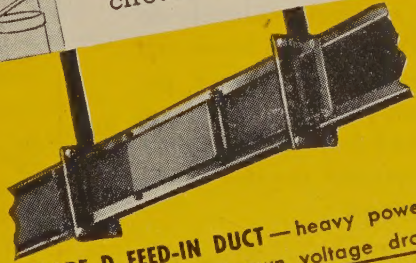
Poor Clem! Aparently the steel didn't last long. We opened an air mail envelope a few days after our admiring description appeared to be confronted with a carefully cut string of 14 paper dolls. Across the bottom was this note: "You make it sound as through getting steel was easy. It isn't!!! Sometimes I feel the strain might be too much. Sincerely, Clem Caditz."

POWER YOU NEED...

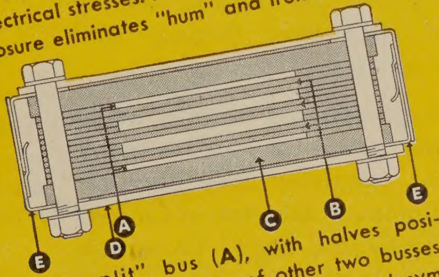
Where you need it
When you need it



• Electrical power is becoming more and more important in modern production methods. It's needed in larger amounts at many and varying locations dependent upon shop layout and machine arrangement. Square D's Feed-in and Plug-in Duct are a combination with an outstanding performance record in hundreds of plants throughout the country. Feed-in Duct handles heavy loads characteristic of large feeder circuits with high efficiency and low voltage drop. Plug-in Duct permits protected branch circuit "take-offs" at frequent intervals along the length of the duct.



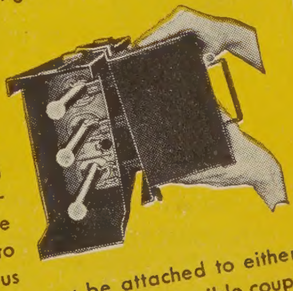
SQUARE D FEED-IN DUCT—heavy power feeder with lowest known voltage drop characteristics. Exclusive design requires no ventilation for limiting temperature rise—permits completely enclosed, dust-excluding structure. Rigid construction resists heavy electrical stresses. Absence of all-metal enclosure eliminates "hum" and iron losses.



"One-split" bus (A), with halves positioned on either side of other two busses, permits close spacing and electrical symmetry important to reduction of both energy loss and voltage drop.

Solid ebonized asbestos insulating plates (B) and (C) which totally enclose bus, have great mechanical and high dielectric strength, conduct heat readily, are impervious to moisture and resistant to arc. Surge clamps (D) every 24" give structural and mechanical strength necessary to withstand 50,000 ampere "shorts." Steel channels (E) complete the housing.

SQUARE D PLUG-IN DUCT—for flexible power distribution to branch circuits. Round bus bars provide greater mechanical strength and resistance to short circuit stresses. Steel enclosure and rotating doors over plug-in openings exclude dust and dirt.



Plug-in units are easily attached. Powerful contact jaws, affording positive pressure, can be "rocked" into position on bus bars. Five units may be attached to either side of each ten-foot section. Flexible couplings join Plug-in bus bars—absorb expansion or contraction and eliminate section alignment problems.

A quick glance tells you what Square D Feed-in and Plug-in Duct do. It takes a closer look to learn how they do it and why they do it better. Your nearby Square D Field Engineer will be glad to give you the complete story. Or write for detailed information.

Address: Square D Company, 6060 Rivard St., Detroit 11, Michigan.

SQUARE D COMPANY
DETROIT • MILWAUKEE • LOS ANGELES
SQUARE D CANADA, LTD., TORONTO, ONTARIO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

water cooled

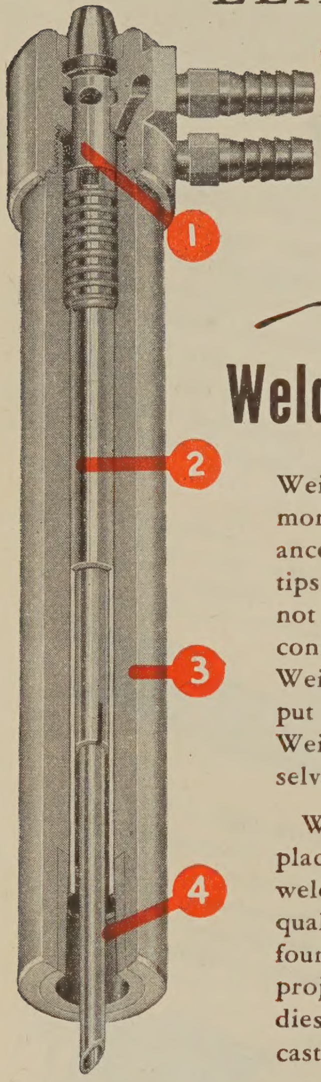
and positively

LEAK PROOF

WEIGER-WEED
TRADE MARK

Heavy Duty

Welding Electrode Holders

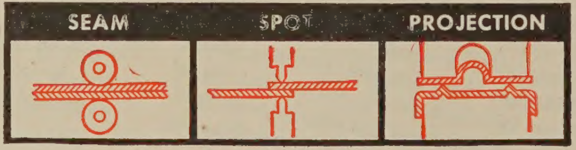


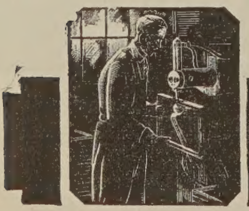
Weiger-Weed Holders are designed to deliver more than enough cooling water for any resistance welding application using replaceable tips. And Weiger-Weed Holders positively do not leak at any water pressure which hoses and connections will withstand. When you put Weiger-Weed Holders on your machines, you put an end to cooling and leakage problems. Weiger-Weed Holders quickly pay for themselves in maintenance savings.

With these holders and Weiger-Weed Replaceable Tips, one can hardly help but reduce welding costs. And this same metallurgical quality and engineering forethought will be found in Weiger-Weed seam welding wheels, projection welding dies, flash and butt welding dies and special alloy bars, forgings and castings.

Weiger-Weed engineers and facilities are at your service to help you solve your resistance welding problems, whatever they may be. Weiger-Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Ave., Detroit 4, Michigan.

(1) Hardened stainless steel knockout plug and leakproof water seal. Spring return assures free water ports and proper tip seating. (2) Non-rusting, nonmagnetic knockout tube. (3) Strong, heavy body assures maximum conductivity, withstands heavy clamping pressure. (4) Hard alloy taper socket will not get out of round or leak.





WEIGER-WEED
TRADE MARK

Resistance Welding ELECTRODES
DIES • TIPS • WHEELS • HOLDERS
DIVISION OF FANSTEEL METALLURGICAL CORPORATION

Dear Editor:

INDUSTRY DIRECTORY

Sir:

Is there a directory in existenc with reference to steel mills, thei locations, products manufacture and pertinent information on thei operations regarding ingot capacit and other data that would give th lay person quick reference to stee operations?

E. V. ZIMMERMAN
Asst. Purchasing Agen

Wagner Electric Corp.
St. Louis

• "Directory of Iron & Steel Works of th U. S. and Canada," published by the Ameri can Iron & Steel Institute, New York, give extensive detail on locations, capacities an personnel of the steel producing companies —Ed.

AIR COMPRESSORS

Sir:

We are in need of air compressor which will develop about 125 ps and low volume for truck installation. Units are to operate through a dc motor from the truck battery Can you give us information on th availability of such units?

JOHN F. MANNISTO
Enginee

Pneu-Hydro Div., F. J. McCarty, Inc.
Cadillac, Mich

• It is likely that a truck battery would b inadequate to power the size unit you want One company we contacted for you puts ou a ½-hp model developing up to 150 psi however, and it might solve your problem Names of companies that can possibly suppl you have been sent.—Ed.

REFRACTORY CONCRETE

Sir:

We are seeking further information on the new development i chrome-base refractory concret capable of resisting temperature up to 3100°F that was mentioned i your Newsfront of March 30. W are interested in obtaining th name and address of the manufacturer so that we may contact him for detailed information.

J. C. SACCONE
Research Departmen

Dravo Corp.
Pittsburgh

• Babcock & Wilcox Co., New York, wi give you detailed information.—Ed.

GEAR CUTTING MACHINE

Sir:

We have repeated inquiries fo machines to cut large size gea wheels (straight spurs) in cast iro or cast steel. Some of the sizes i demand are 171.866-in. pitch circl diam, 6-in. circular pitch and 21-in

we can talk cleaning till we're

blue in the face

OAKITE MATERIALS
for Better Metal-Cleaning

OAKITE COMPOSITION NO. 97 for machine pre-cleaning before pre-paint treatment; electrocleaning: Dissolves, removes buffing, drawing compounds. Details in Report 8153

OAKITE COMPOSITION NO. 92 for steam cleaning: Detergent action removes grease and dirt quickly. No toxic vapors. Free-rinser. Details on request.

OAKITE COMPOSITION NO. 90 for electrocleaning: Wets, emulsifies, loosens dirt and oils. Fine bubble blanket traps troublesome spray. FREE data on request.

OAKITE COMPOSITION NO. 3 for burnishing: Superior lubrication; thick suds; free rinsing. Facts on this and barrel cleaning in FREE Report 6705.

OAKITE CRYSCOAT to condition ferrous metals for paint, lacquer: Thoroughly removes soils, leaves inert phosphate film that holds paint. Details in FREE Report 6731.

FREE OAKITE SERVICE REPORTS!
Check those you want. Clip and send with your name and address to
OAKITE PRODUCTS, INC.
30H Thames Street, New York 6, N.Y.

We could use up a lot of words telling you how good Oakite cleaners are. How much money you stand to save using Oakite cleaning methods. How many benefits Oakite in-plant service gives you.

And we could brag about our free informative literature, our free blueprints for building and installing modern cleaning equipment. We could mention the fact that we issue, on loan, various controllers for maintaining proper cleaning solution strength and temperature . . . that we supply our customers with dispensing devices to help stretch cleaning supplies.

We could tell you that we've been in this cleaning business for nearly 40 years. We could tell you all these things—and be telling the truth. But words are cheap; that's why we'd rather act than talk. Let us prove, on your tough or routine cleaning problems, that our actions speak louder than words.

Technical Service Representatives in Principal Cities of U. S. & Canada

MATERIALS
METHODS
SERVICE

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REG. U. S. PAT. OFF.

Specialized Industrial Cleaning
MATERIALS • METHODS • SERVICE

HALLDEN
Automatic Shears

why HALLDEN LEADS

CONTINUOUS FEED

Continuous feed of metal through the machine is obtained by synchronizing the flattener with the flying shear, eliminating "stop and start" cutting.

CUTTING ACCURACY

Cutting accuracy up to 1/64" plus or minus is obtainable with the Hallden Automatic Shear. After cutting, metal is conveyed or stacked, depending upon the customer's requirements.

FLEXIBLE DESIGN

Flexible design allows quick change of shear knives and ease in removal of flattening rolls for grinding. Shear knives have four cutting edges and always move in a mutual plane.

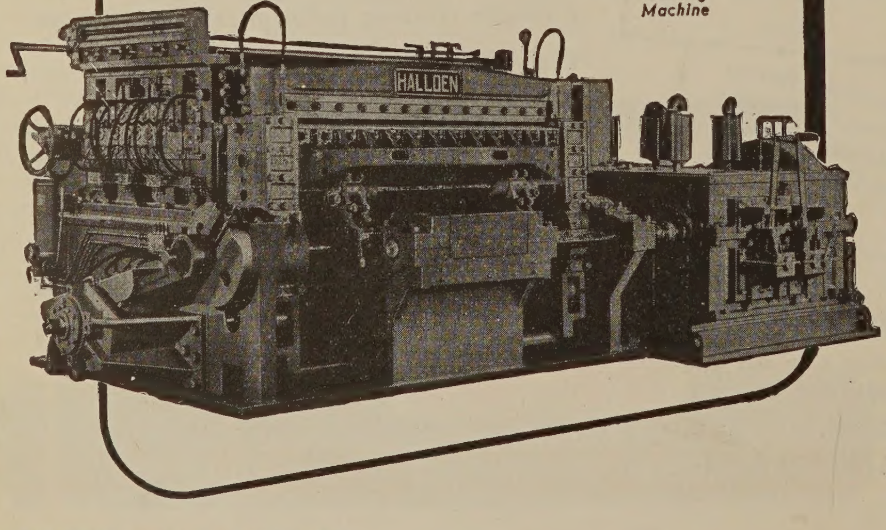
RUGGED CONSTRUCTION

Rugged construction permits continued hard use with little attention other than lubrication. Flattening rolls are individually driven to keep maintenance to a minimum.

THE HALLDEN MACHINE COMPANY
THOMASTON, CONN.

Sales Representatives
The Wean Engineering Co., Inc., Warren, O.
W. H. A. Robertson & Co., Ltd., Bedford, England

Typical Hallden Automatic Flattening and Cutting Machine



face; also 135.918-in pitch circle diam, 3½-in. circular pitch and 14½-in. face, with smaller pinions to suit a ratio of 7/1 or smaller. All these gears are for slow moving sugar machinery or similar units in which no extreme accuracy is required.

We consider the cost of hobs too high for occasional jobs and would like quotations and details of a shaper type machine to take up to 18-ft diam wheels. The machine should be suitable for a wide variety of work rather than for quantity production.

Could you forward this inquiry to a manufacturer able to quote for such gear shaping machinery.

K. O. FORRER
Manager

Forrer's Pty. Ltd.
Ipswich, Queensland, Australia

• Very few machines outside the field of marine gearing can cut gears of the type you mention, and most marine gears have considerably smaller pitch than 6-in. circular pitch. Your inquiry, however, has been forwarded to the two U. S. manufacturers who make cutters of the type you would require. Also, it might be possible for you to purchase a large, but very expensive, excess marine gear hobber and rebuild it for handling of the coarse pitches involved. —Ed.

LAMINATION DIES

Sir:

We would like to know if it would be possible to obtain six copies of an article from the May 3, 1945 issue entitled "Increasing the Life and Accuracy of Lamination Dies."

M. R. PARENT
Material Analyst

Westinghouse Electric & Mfg. Co.
Lima, Ohio

• Unfortunately our supply of back issues is inadequate to permit sending six copies. However, one set of tearsheets has been mailed and you can obtain additional copies through the photostatic service of the Engineering Societies Library, New York.—Ed.

MARTEMPERING

Sir:

I would appreciate receiving a copy of the article "Martempering" which appeared in the Jan. 28 and Feb. 4, 1943 issues.

CHET HERN
Metallurgist

Scully-Jones & Co.
Chicago

• Tearsheets have been sent.—Ed.

ALUMINUM ALLOY TEMPERS

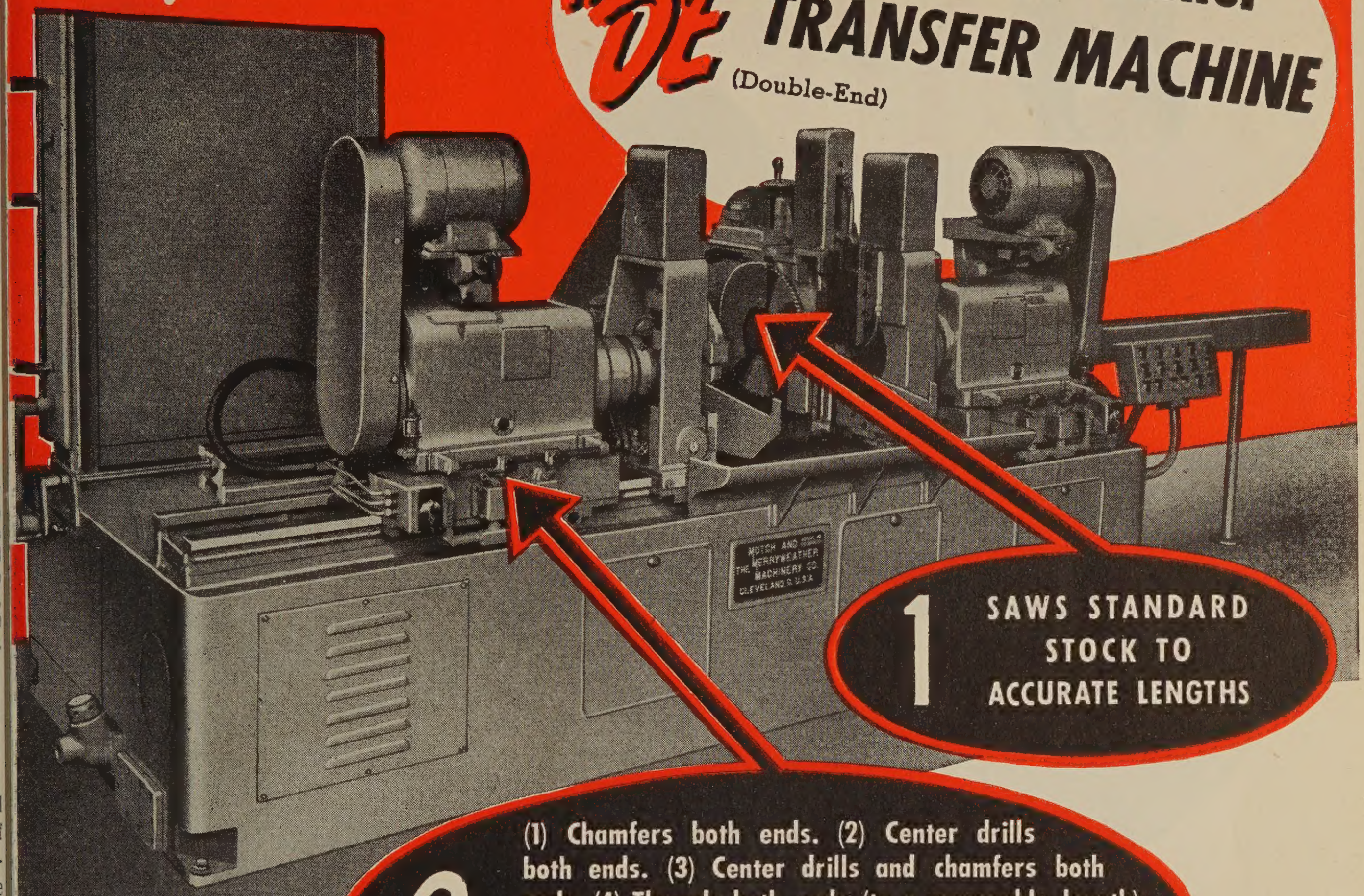
Sir:

It has been pointed out that there is some similarity between portions of R. B. Smith's article "New Temper Designations for Aluminum

Substitute 1 Machine for 3 or 4!

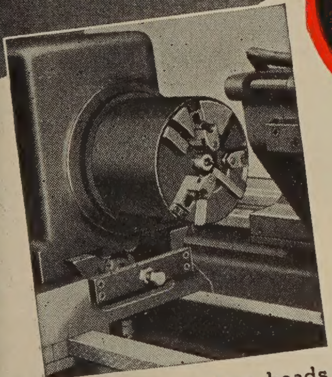
The Motch & Merryweather "DE" TRANSFER MACHINE

(Double-End)



1 SAWS STANDARD STOCK TO ACCURATE LENGTHS

2 (1) Chamfers both ends. (2) Center drills both ends. (3) Center drills and chamfers both ends. (4) Threads both ends (to a reasonable length). (5) Trepans one or both ends. (6) Turns one or both ends (box tool). (7) Chamfers O.D. and I.D. of tubing. (8) Reams one end or both ends of tubing. (9) Chamfers O. D. and reams both ends of tubing.



Rugged secondary heads with simple gear reduction to husky spindle. Positioning slide adjusted quickly by rack and pinion. Hydraulic feeds and variable speeds.

MORE THAN A NEW MACHINE—ACTUALLY A NEW METHOD

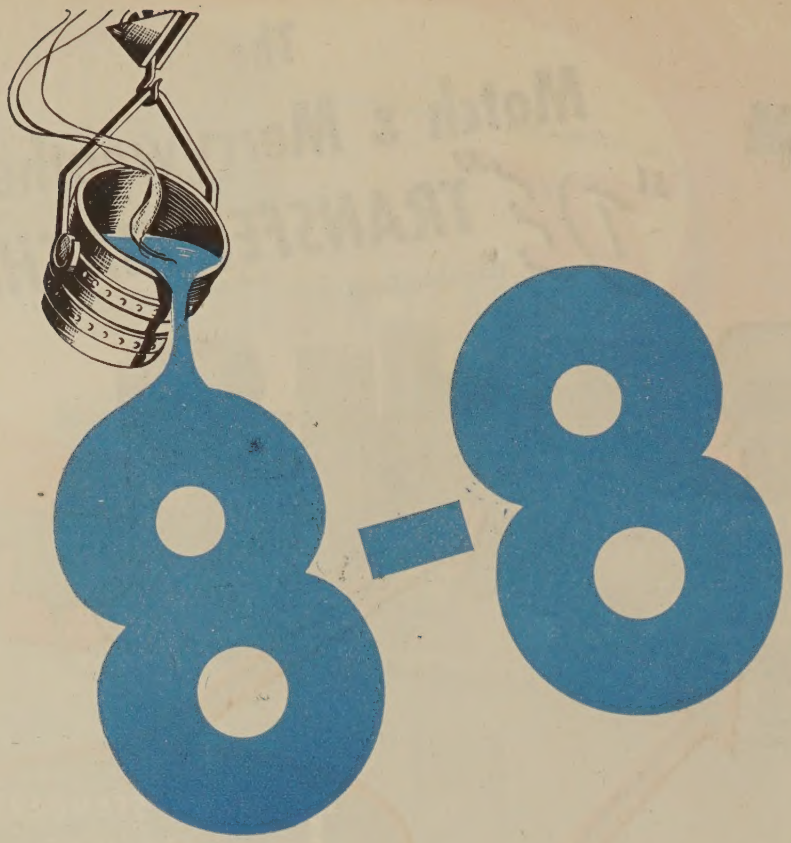
The Motch and Merryweather "DE" (double end) Transfer Machine has no equivalent. Standard bar stock is automatically fed, cut off with a square *milled finish,* to accurate lengths of ±.004"; then automatically transferred to equalizing, self-centering jaws for accurate double-end machining. You save at least one operator; save several handlings; save overhead and floor space; save tooling. Husky construction makes for trouble-free service and long, profitable life.

Get the facts about this remarkable new but thoroughly proven machine.

Only M & M builds ALL 3:
CIRCULAR SAW
SAW BLADE
BLADE GRINDER

THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING • CLEVELAND 13, OHIO

AT YOUR COMMAND • AN UNPARALLELED EXPERIENCE IN CIRCULAR SAWING



it *will* save your money
it *may* save a product
it *has* saved a life

LEBANON CIRCLE Ⓛ 22

An "18 - 8" Alloy

NOMINAL ANALYSIS

Carbon Max.	0.07
Silicon	1.25
Manganese	0.75
Chromium	19.50
Nickel	9.00

NOMINAL PHYSICAL PROPERTIES

Tensile Strength	75,000
Yield Point	36,000
Elongation in 2"—%	50
Brinell Hardness	135

NO other alloy satisfies the exacting demands of industry in so wide a range of applications as Circle Ⓛ 22, the time-tested "18 and 8". It is saving money every hour of every day by lengthening equipment life, cutting repairs and plant "down-time". It guards product quality against contamination by corrosion. In handling dangerous gases and liquors, men's lives depend on the integrity of castings made from this "18 and 8" alloy.

A set of data sheets describing Circle Ⓛ 22, 22 M and 22 XM, Lebanon's "18 and 8" alloys, is yours for the asking.

LEBANON STEEL FOUNDRY • LEBANON, PA.
"In The Lebanon Valley"

ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

LEBANON Castings
ALLOY AND STEEL

Alloys" in the June 24 issue an
certain publications of other alum
num producers.

Such similarity is inevitable sinc
most of the article is devoted
definitions of terms which, in th
interests of uniformity and clarit
should never be reworded whe
carried in an article such as this.

Thus similarity will be noted be
tween material in Mr. Smith's ar
ticle and portions of other publica
tions such as "Alcoa Temper Desig
nations for Cast and Wrought Proc
ucts," "Aloca Aluminum and I
Alloys," published by the Aluminu
Co. of America; as well as the fo
lowing Reynolds Metals Co. publ
cations: "Temper Designations fo
Aluminum Mill Products," "Ne
Temper Designation System" fro
Reynolds Aluminum Div. Sal
Manual, and "Temper Designatio
for Aluminum Alloy Mill Product
in Reynolds Metals "Technical Ad
visor" Vol. 1, No. 8.

This similarity will also be foun
in material published by Perma
nente Products Co.

We regret omission of a cred
line mentioning these publication

G. W. BIRDSALL
Mgr., Tech. Editorial Servi
Reynolds Metals Co.
Louisville

RADIO FREQUENCY HEATING

Sir:

We were very much interested i
the article "The Practical Eco
nomics of Radio Frequency Hea
ing" which appeared in the Jun
10 issue. Could we obtain eith
a reprint or tearsheets of the ar
ticle?

JAMES S. MEYER
Metallurgi
International Business Machines Corp.
Endicott, N. Y.

ZINC DIECASTINGS CLEANER

Sir:

In the June 17 issue there is a
article "Acidic Emulsion Clean
for Zinc Base Diecastings." W
would appreciate your sending
the name of the manufacturer
this cleaner, Dykasol . . .

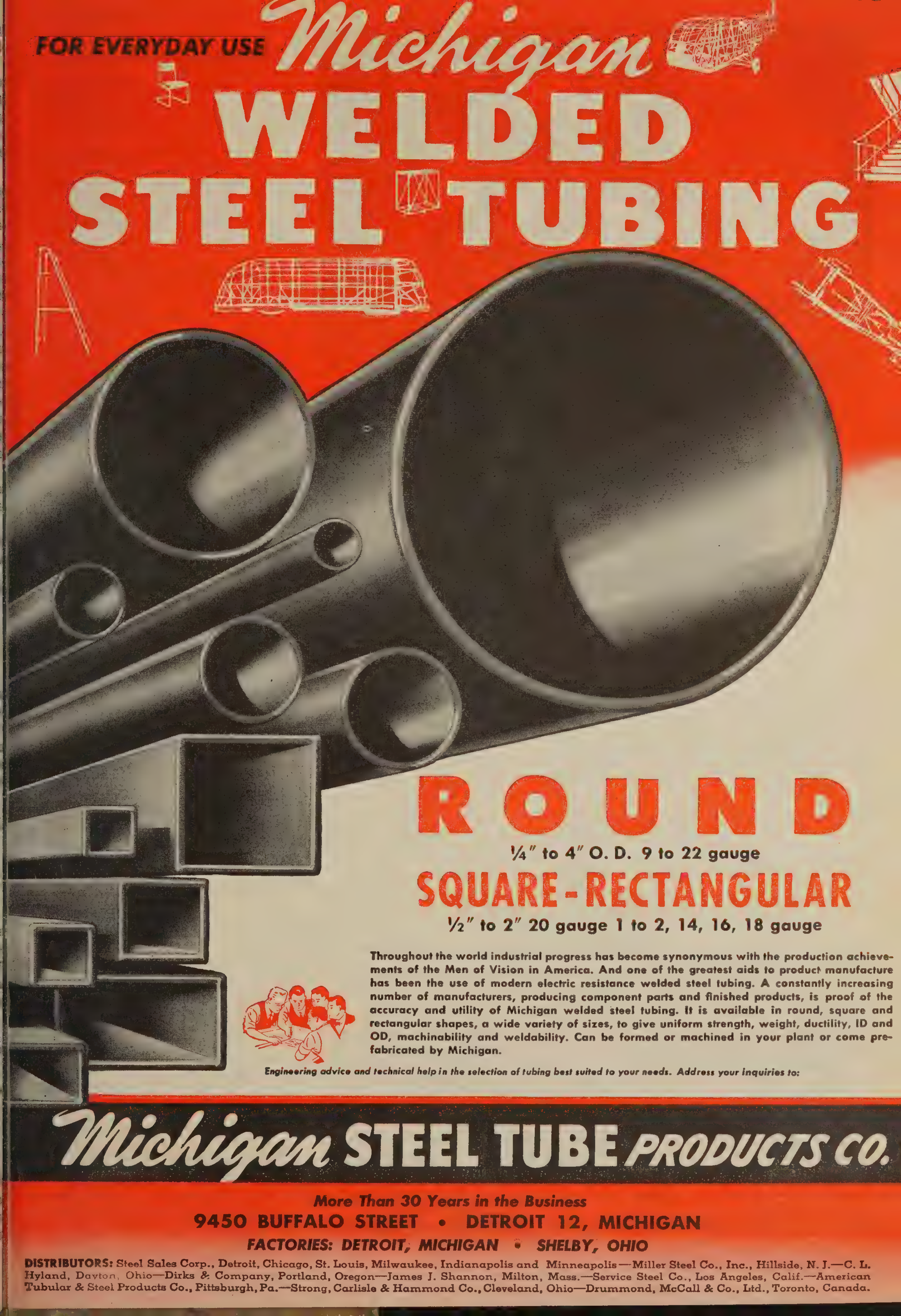
M. KALETA
Production Manag
Keil Lock Co., Inc.
Charlestown, N. H.

• American Chemical Paint Co., Amble Pa., makes the cleaner.—Ed.

HEMATITE?

Sir:

Regarding the news dispatc
dealing with Rhodesian ore in you
June 10 issue, I do not understan
the distinction between 800 millio



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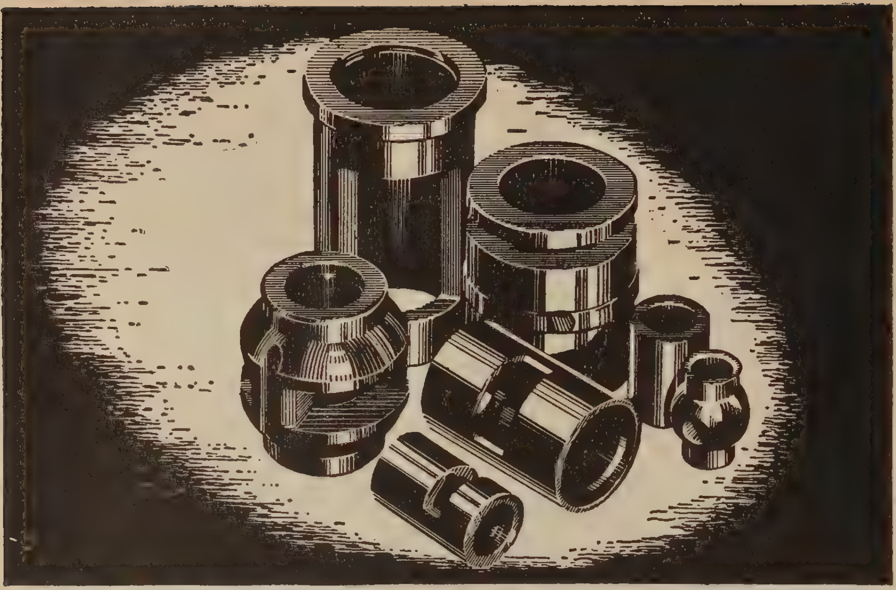

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tons of high grade iron ore and 40 million tons of high grade hematite ore. What kind of ore is the 800 million tons if not hematite?

JUDSON S. HUBBARD
Vice President

Humphreys Investment Co.
Denver

• The 800 million tons could be magnetite, limonite, siderite or any of a number of ores. Since the dispatch intimates high silica content, the bulk of the material is more likely to be chloropal or other ores very few of which are of commercial value at present.—Ed.

TESTING SOFT METALS

Sir:

Will you please let us have best price and delivery on one copy of each of the following articles: "Hardness Testing of Soft Metals," from the June 24 issue; and also "Welding Dissimilar Metals With Stainless Electrodes," "Common Sense of Spring Design" and "Bonding Aluminum to Ferrous Metals" from the July 1 issue.

C. C. COPENHAVER
Purchasing Agent

Eastern Stainless Steel Corp.
Baltimore

• Tearsheets of each of the articles have been sent, gratis.—Ed.

HEAT TREATING GEARS

Sir:

We would like to have copies of the following articles . . . "Flame Hardening of Cast Iron" from your Oct. 19, 1939 issue, "Heat Treating Aircraft Gears" from the June 26, 1941 issue and "Manufacture of Aircraft Gears" from the Dec. 24, 1942 issue.

G. CAMERON
Engineering Dept.

Palmer-Bee Co., Radar & Gear Div.
Detroit

• Tearsheets of the articles have been sent. —Ed.

PRICING SYSTEM CHANGE

Sir:

In the last few weeks there have been numerous accounts and comments relative to the abandonment of the basing point pricing system. I have encountered some difficulty in obtaining a complete picture from these accounts. In some cases the statements appear to be contradictory, or incomplete, or they are so written that it is difficult to determine where facts end and a reporter's more or less informed opinion takes over.

I would like to see something more complete and authoritative about the impact of the change upon both the steel industry and the rest of the economy, and I

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KEYSTONE STEEL & WIRE COMPANY
PEORIA 7, ILLINOIS

would appreciate it very much if you will send me any articles you have published on the subject, or refer me to any published statements which would be particularly enlightening.

JOHN M. HARTWELL
New York

• Iron Age references, covering consumer as well as producer problems, from recent issues which should help you are as follows: May 6, p. 121, 123, 124, 131; May 13, p. 104, 120, 121; May 20, p. 125; June 3, p. 129; June 10, p. 121; June 24, p. 119; July 1, p. 116, 119, 120, 121, 123; July 8, p. 119, 120; July 15, p. 116, 125, 126; and July 22, p. 119, 120.

A HAPPY READER

Sir:

I notice that you have a brief index on the cover sheet. This is a feature that all magazines should have to save executives valuable time looking for the index. I wish to congratulate you on this feature.

G. H. BOHN
Linde Air Products Co.
Tonawanda, N. Y.

VACUUM CASTING

Sir:

Please forward a copy of the article "Wetherill Vacuum Casting Process" from the Aug. 14, 1947 issue.

L. E. CHAUNDY, JR.
National Precision Casting Corp.
Clifton Heights, Pa.

• Tearsheets have been mailed.—Ed.

SCRAP PRICES

Sir:

Would appreciate it if you would send me any information you have showing The Iron Age heavy melting steel scrap composite, and/or the price of No. 1 heavy melting steel, Pittsburgh, for the years 1910 through 1915. I have this information for subsequent years.

B. E. ETCHEVERRY
Director, Cost & Commercial Planning
Kaiser Co., Inc.
Oakland, Calif.

• Tabulation of the composite price by months for those years has been sent.—Ed.

POLARIZED PAINT SPRAYING

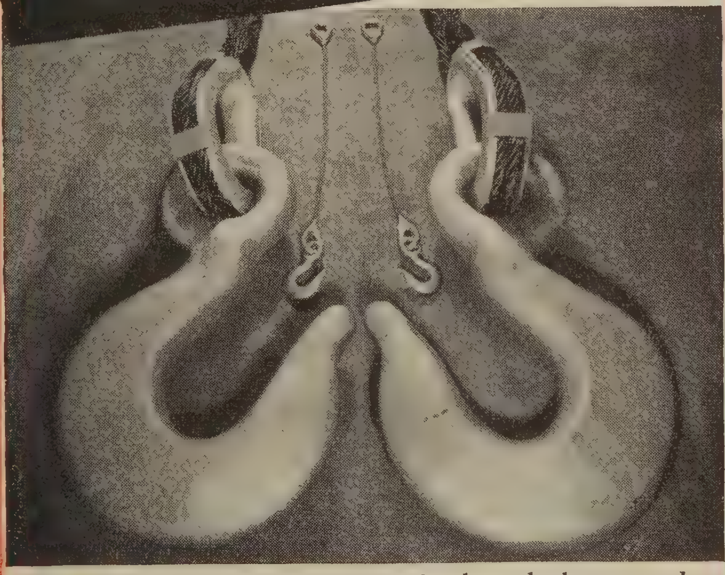
Sir:

Some years age the writer read an article in your magazine about polarized paint spraying. We are interested in this equipment and would appreciate it if you could give us the names of firms manufacturing it.

G. JANZON
Sandvik Steel, Inc.
New York

• The article you have in mind is probably either "Electric Spraying" in the June 25

MACWHYTE WIRE ROPE SLINGS



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Completely automatic, the Dravo *Counterflo* Heaters require only a fuel line, power line and short vent stack—no boiler room. The thermostat is lowered or shut off completely at night for additional, important economies.

Dravo heaters produce warm air quickly. Sturdy, carefully engineered construction, plus a stainless steel combustion chamber, minimize maintenance cost. Equally efficient with oil or gas, sizes ranging from 400,000 to 2,000,000 BTU per hour output are available. A touch of the selector switch converts them immediately to high-capacity air-circulating units for summer use.

If you would like more information to help solve your own heating problems, write for Bulletin JC-516, Heating Section, Dravo Corporation, Dravo Building, Pittsburgh 22, Pennsylvania.

Living room comfort speeds production and cuts absenteeism in this modern garment manufacturing plant. As the manager, Mr. Barry says, "Women employees cannot be expected to operate sewing machines properly if their hands and feet are cold or if they are otherwise uncomfortable."

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DRAVO

1942 issue or "Electrostatic Spraying and Detearing" from the Oct. 19, 1944 issue. In such work standard spray guns can be used, but special power packs and other units are needed. Harper J. Ransburg Co., Indianapolis, will give you further details. —Ed.

METAL FINISHING MANUAL

Sir:

Please send one copy of your Metal Finishing Manual.

H. A. SPADE
Research Laboratory

Armco Steel Corp.
Middletown, Ohio

• The Manuals are $3.00 each.—Ed.

BLAST FURNACE OPERATIONS

Sir:

I am interested in the percentages of "in blast" furnaces from month to month. Could you inform me as to where this data could be obtained dating from January 1941?

H. R. SECKEL

Oakland, Calif.

• American Iron & Steel Institute, New York, will give you the information.—Ed.

HEAT RESISTANT ALLOYS

Sir:

Please send us two reprints of the article "A Summary of Heat Resistant Alloys from 1200° to 1800°F" from the May 25 and April 8 issues. Articles such as this one are of great help in our work.

R. RAAB
Head, Materials Unit
Engineering Laboratories

Glenn L. Martin Co.
Baltimore

TIME STUDY COMPUTATIONS

We would appreciate it very much if you would forward to us a set of tearsheets of the article "Right and Wrong of Time Study Computations" which appeared in the Aug. 17, 1944 issue.

A. S. DAVIS

Dexter Folder Co.
Pearl River, N. Y.

• Tearsheets have been mailed.—Ed.

STEEL CEMENT

Sir:

We are interested in contacting the manufacturer of Cinch Steel Powder which is used in brazing high speed to mild steel.

W. S. GETCHELL
Engineer

Getchell Steel Treating Co.
Minneapolis

• Cinch Steel Cement, put out by W. R. Chapin Co., Indianapolis, is probably the product you have in mind.—Ed.

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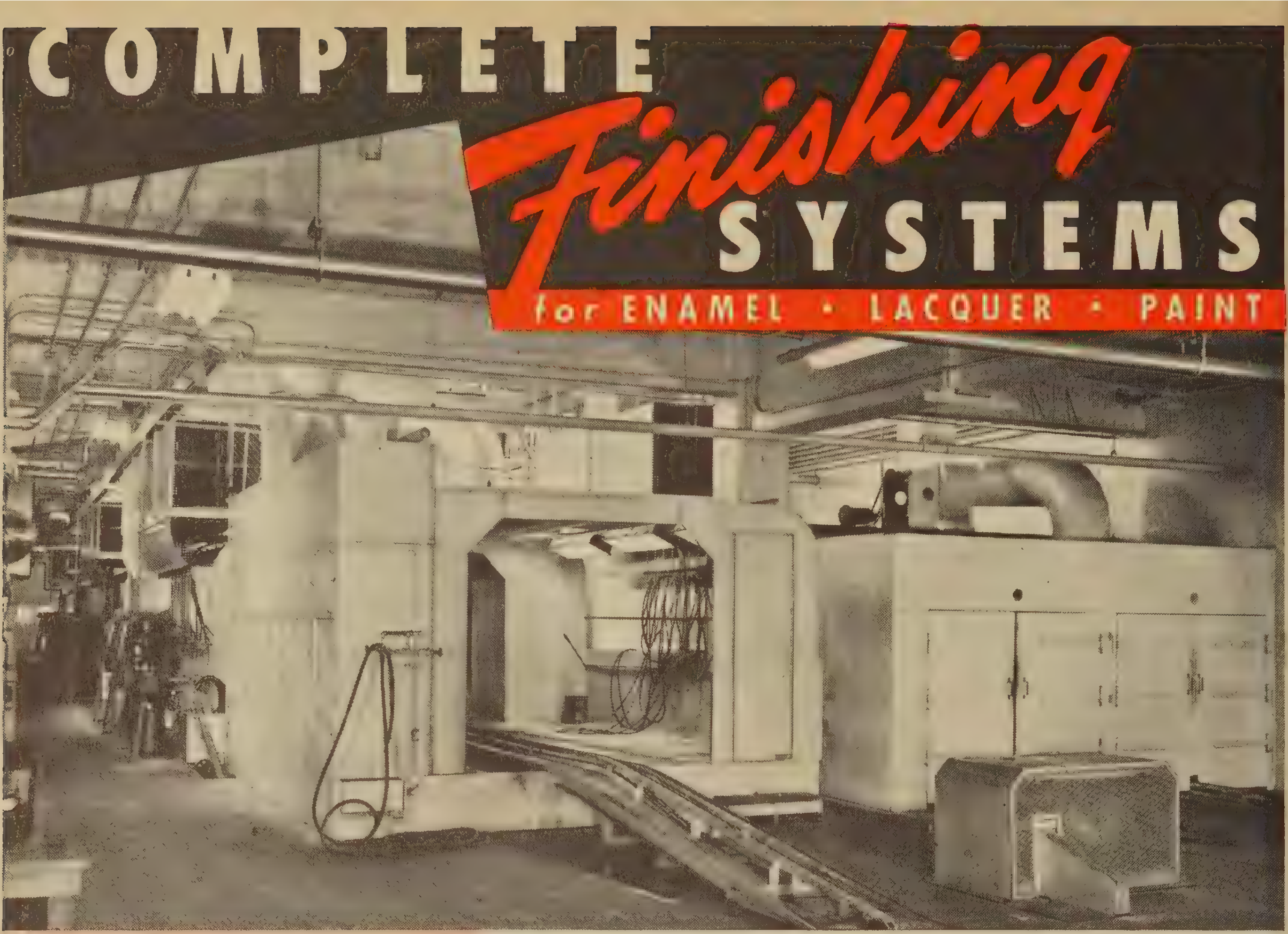

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August 12, 1948

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A Little Honesty, Please

THIS is a campaign year, with both parties vying for the support of the voter. Still in power is an administration which has held office for 16 years. The attempt of the Democrats to win this election is faced with almost insuperable obstacles. Entirely aside from the schism within the party or the merits of opposing candidates and platforms, American history shows that any attempt to extend tenure beyond four terms is almost hopeless. Plain ennui by the voters makes it highly probable that the present occupant of the White House will move out and that the standard bearer of the opposition will move in.

Since this contest is not close, and the outcome almost foregone, both parties could afford a degree of candor which ordinarily might not be politically practical. This is particularly true on the issue of inflation. The indexes clearly show that the cost of living has reached a new peak, exceeding even the high point of 1920. The distracted housewife with a budget finds it increasingly difficult to make ends meet. Her grievance is real.

It is, therefore, tragically reprehensible to find members of both parties cooperating in the perpetration of an indefensible hoax. They are currently considering the imposition of added bank and consumer credit controls for the alleged purpose of checking a further rise in the cost of living. Specifically, they are weighing an increase in bank reserve requirements and limits on consumer credit.

The possible relation of legal reserve requirements against bank deposits to the price level is a subject of extraordinary complexity and abstraction. The very fact that this relationship is only dimly understood by our legislators and even less so by the public makes it eligible as a mystic abracadabra that can be prescribed painlessly for inflation.

The plain fact is that the precise level of reserve requirements, let us say in central reserve cities, be it 26 pct as now permitted or 36 pct as Chairman McCabe suggests, has no more to do with the high price of hamburger than the part in Mr. Truman's hair. The same may be said of the proposal to regulate the manner in which a steel worker finances the purchase of a refrigerator.

These are shallow legislative subterfuges that rely upon the ignorance of the voter and reflect no credit on the probity of the solons considering them. They may make it possible for politicians of both parties to return to their constituencies and report firm action in the face of crisis. To create the impression that such measures will reach the heart of the inflation problem constitutes a cruel deception of a public which deserves better from its elected representatives.

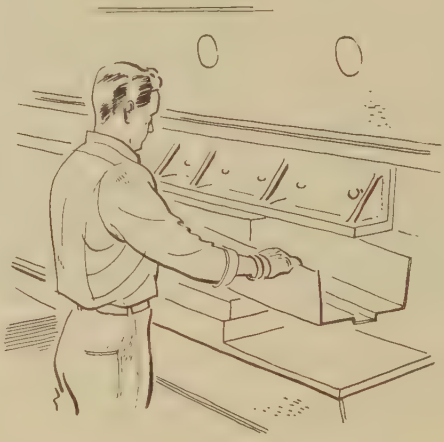
The causes of inflation, as the Board of Governors of the Federal Reserve System should know, are to be found in the abandonment of the gold standard, a huge public debt which can be completely monetized, the conscious and deliberate support of farm prices above natural market levels, and the complacent acceptance of three rounds of wage increases.

When a government which has just spent $10 million to buy potatoes for the obvious purpose of keeping prices high proposes to raise reserve requirements in order to lower the price of these same potatoes, we see an example of double-dealing that reflects on the intelligence and the honesty of our leaders.

Joseph Stagg Lawrence

"I like the UNIFORMITY of Inland Steel"

PRESS brake operators know that time and material losses—due to cracking and scoring—rise rapidly when the steel sheets they bend *vary* in chemical composition, mechanical or surface characteristics. That's why they prefer steel that's *uniform . . . steel made by Inland.* Uniform source of raw materials, uniform steelmaking procedures using the same modern equipment, uniform workmanship—made possible by Inland's completely integrated, closely knit plant—explain why the Inland Steel received today will be of the same high quality as that received last month . . . or last year. INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.



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NEWSFRONT

► There's trouble brewing within the ranks of the United Auto Workers union. But Walter Reuther isn't going to let factionalism or politics interfere with the welfare of his workers again -- as it has in the past. Chief source of opposition seems to come from deposed union members and several ousted board members who feel that Reuther is not driving a good bargain when it comes to pensions, social security and insurance benefits.

► A 10 pct general price increase in machine tools is under way with some machines moving up as much as 15 pct. Preliminary reaction of some customers is that delivery at this time is more important than price.

There is growing dissatisfaction in the industry with the way foreign dealers are handling machine tool requirements under ECA. This may bring the builders around to sending sales representatives abroad on a more or less permanent basis.

► American highways are in no condition to absorb the increase in truck traffic which is just getting underway as a result of the steel pricing change. Good tractors and trailers are now at a premium. And they will be increasingly difficult to get since many small mills and warehouses are fast going into the trucking business.

► Talk about a 60,000 ton press for the Air Forces appears yet to be in the talking stage. Despite reports that it is being constructed, no work has been done beyond the design stage. The press is reported to be intended for shaping aircraft wing skins.

► Government departments now believe that their earlier estimates of construction for 1948 set at $15 billion should be boosted another $3 billion. Should the new estimate prove correct, the steel industry would be called upon to provide an additional 1.5 million tons of steel for building materials.

► The drive on accident prevention in the past decade is paying big dividends in the steel industry. The 1947 record of 6.08 disableing accidents for every million manhours of work is the lowest accident frequency in its history, and placed steel third lowest for the year when compared with 40 other major industries. Oddly enough, it seems safer to work in the steel mills than in the tobacco, textile, rubber or food industries since their accident frequency rate is higher.

► Pittsburgh has captured one Detroit auto parts company and hopes to get some more. The Detroit Board of Commerce says the prospects are alarming and has called on the big wheels of the automotive industry to try to get more steel producing capacity in Detroit.

► Watching the advancing cost of living, auto statisticians are wondering how much GM will have to add to its wage rates during the remainder of 1948 under the terms of its escalator clause. Experts look for a boost of three cents as soon as the next BLS figures are announced. What comes after that is anybody's guess.

► Emergence of Douglas Aircraft Co., Inc. as a fabricator of automobile fenders was not a spur of the moment conversion. For sometime Douglas has been exploring the possibility of producing fenders, radiator shells, wheels and similar automotive components. However, the new metal fabricating division will require considerable tonnages of the more scarce steel items. This may serve to delay full scale production.

► Stepped up depreciation allowances -- set aside without tax credit -- appear to be a permanent fixture of many steel company earnings reports. This will continue as long as their earnings are good and replacement costs per ton are as high as six times the original cost at integrated mills.

► Most tinplate producers now believe that high speed lines and improved techniques make the production of 1-lb per base box tinplate by electrolytic deposition commercially possible. This material could largely be used in place of hot tip tinplate. But the present demand for material of lesser coating weights is still so strong that no capacity is being diverted to such work.

► In order to keep the plant modern and efficient, Lone Star Steel Co. will shut down its Daingerfield, Texas, blast furnace for 30 days to install a carbon block bottom. They will also expand slag production facilities to meet high demand for burden in that area.

Some Factors Influencing the Performance of Cupola Fuels

By C. C. WRIGHT
Chief, Division of Fuel Technology,
School of Mineral Industries,
Pennsylvania State College,
State College, Pa.

In spite of the long history of the cupola, as compared to most other developments of our industrial age, its operation is barely emerging from an art into a science. Much of the fundamental information necessary to develop cupola operation into a science is available, however, and in recent years definite steps have been taken toward the application of some of this information.

Although the combustion of fuel in a cupola appears to be one of the simplest of operations in which a deep bed of ignited fuel burns in a blast of air, there are a number of important variables that influence the overall results. Among these are the chemical composition, size and reactivity of the fuel, the physical makeup of the bed and the charges, and the velocity and humidity of the air. Numerous studies of both theoretical and practical character have developed information from which a reasonably sound understanding of the entire process can be evolved.

The major chemical reactions between fuel and the reactive constituents present in gases in their probable order of importance to cupola operation are:

$$(1)\quad C + O_2 \rightleftarrows CO_2$$
$$(2)\quad C + CO_2 \rightleftarrows 2CO$$
$$(3)\quad C + H_2O \rightleftarrows CO + H_2$$
$$(4)\quad CO + H_2O \rightleftarrows CO_2 + H_2$$

In the following paragraphs these reactions are discussed individually from the viewpoint of their influence upon cupola operation and performance.

Reaction (1):

Btu per
lb mol

$$\underset{\text{graphite}}{C} + O_2(g) \rightleftarrows CO_2(g) \qquad \Delta H^{77°F} = -169{,}294 \qquad \Delta H^{2800°F} = -170{,}600$$

This is the heat producing reaction of the process and at the temperatures prevailing in the combustion zone of the cupola (over 2800°F) the following factors are of interest:

Particularly appropriate in meeting today's problems of lower quality fuels is this discussion of chemical and physical factors influencing the performance of cupola fuels. A thorough understanding of these basic considerations is an important aid in obtaining improved cupola performance. The subjects discussed herein include metal-to-fuel ratio, metal composition, cupola diameter, moisture content of blast, fuel reactivity and fuel size.

(a) The rate of the chemical reaction between carbon and oxygen is for all practical purposes instantaneous; and the overall rate is controlled by surface area of the fuel and by the rate of mass transfer of oxygen to, and carbon dioxide away, from the surface. Diffusion through the film surrounding each piece of fuel is extremely rapid; hence, the rate of the reaction is a function of the rate of oxygen supply or blast velocity.

(b) Rate of mass transfer and not chemical reaction being the controlling factor, external and not internal surface is of significance and reactivity of the fuel is of little consequence.

(c) As the gases pass up through the ignited fuel in the cupola, the concentration of carbon dioxide increases rapidly and the concentration of oxygen decreases correspondingly. In a zone about 5 to 7 diameters from the point of air entry, the oxygen concentration will be reduced to one pct or less and the carbon dioxide concentration will reach a maximum. This is the zone of maximum temperature in the cupola and may be in excess of 3000°F.

(d) The temperature in this zone will not vary much with change in blast rate. Increase in the air supply will result in a faster rate of burning, but also in a faster rate of heat transfer from the zone as sensible heat of the gases. Over the range of blast normally employed in cupola practice the two influences approximately counterbalance each other.

Reaction (2):

Btu per
lb mol

$$\underset{\text{graphite}}{C} + CO_2(g) \rightleftarrows 2CO(g) \qquad \Delta H^{77°F} = 74{,}196 \qquad \Delta H^{2240°F} = 71{,}035$$

This heat absorbing reaction is of considerable importance to cupola operation and a knowledge of the factors influencing its rate are essential to an understanding of the behavior of fuel in the cupola.

(a) The reaction is strongly endothermic; hence, as the reaction proceeds, heat is absorbed and the temperature in the cupola is lowered. It follows that the temperature in the cupola decreases progressively above the zone of maximum carbon dioxide concentration due to this endothermic reaction.

(b) The rate of the reaction is relatively slow compared to the rate of diffusion and chemical reactivity is, therefore, the controlling factor.

(c) The rate of the reaction increases with increase in temperature, but even in the highest temperature zone of the cupola is relatively slow in terms of time of contact. The total time required for the gases to pass through the cupola is in the order of 1 to 3 sec. Hence, the time of contact between the gases and the hottest sections of the reduction zone is only a few tenths of a second. The rate of the reaction is, therefore, dependent upon the blast velocity.

(d) The rate of the reaction is a function of the reactivity of the fuel. However, the rate of change of reactivity of different fuels is influenced markedly with temperature. Because the time of contact is so short, the temperature range of interest in cupola operation is only that in which the chemical reaction is relatively rapid and this temperature range is located principally below the melting zone.

The length of the reduction zone in the cupola then is a variable depending upon the time of contact or blast velocity and upon the reactivity of the fuel. The higher the reactivity or lower the blast rate, the shorter the reduction zone. The lower the reactivity or the higher the blast rate, the longer the reduction zone.

Reaction (3):

Btu per
lb mol

$$\underset{\text{graphite}}{C} + H_2O(g) \rightleftarrows CO(g) + H_2(g) \qquad \Delta H^{77°F} = 56{,}488 \qquad \Delta H^{2240°F} = 58{,}077$$

Although not generally considered one of the major reactions occurring in the cupola, this reaction may, during hot humid weather, be of considerable importance. At 95°F and 90 pct relative humidity, one mol of water vapor enters the cupola with each four mols of oxygen. As temperature or humidity decreases, the quantity of water vapor carried into the cupola with the air decreases.

(a) This reaction is also strongly endothermic and the higher the temperature at which the reaction occurs, the more endothermic it becomes. At the highest temperatures attained in the cupola the heat absorption approaches that of reaction (2), and the effect of the reaction is to cool the cupola in a manner similar to reaction (2).

(b) As with (2), chemical reactivity rather than diffusion is a controlling factor and the rate of the reaction increases with increase in temperature.

(c) Some confusion exists as to the relative rates of reactions (2) and (3). Initially (3) appears to be much faster than (2), but hydrogen which is one of the products retards the reaction. Depending, therefore, upon the speed with which the hydrogen can be removed from the reaction zone and upon its initial concenetration, the rate of (3) may be faster or slower than (2).

The influence of this reaction upon cupola operation, therefore, will be similar to that of reaction (2) and the extent of influence will be roughly proportional to the relative proportions of water and oxygen in the air supply.

Reaction (4):

Btu per lb mol

$$CO(g) + H_2O(g) \rightleftarrows CO_2(g) + H_2(g) \qquad \begin{array}{l} \Delta H^{77°F} = -17{,}708 \\ \Delta H^{2240°F} = -12{,}958 \end{array}$$

As with reaction (3), this reaction is not generally considered of significance in cupola operation, and is only of importance when the water vapor content of the air is appreciable.

(a) At the temperatures existing in the cupola, the reaction is exothermic, but the total heat liberated is usually insufficient to have any major influence upon temperatures.

(b) In the presence of carbon, which appears to act as a catalyst, the reaction is virtually instantaneous.

(c) The equilibrium constant of the reaction changes rapidly with temperature, ranging from approximately 0.3 at 3000°F to approximately 5 at 1000°F. Thus the carbon dioxide content of gases discharged from the stack may be increased to some extent if significant quantities of water vapor are being introduced with the air. For cupolas in which air quantities are controlled by stack gas analysis, this reaction may introduce a small error.

The foregoing considerations are depicted graphically in fig. 1 for the idealized case in which the blast is introduced uniformly across the cupola at tuyere level and the entering air is free from moisture vapor. Actually, the zone of maximum temperature and the melting zone assume more nearly the shape of an inverted cone with all the zones higher near the wall and lower in the center of the cupola than for the idealized case. This is because the air is introduced through ports or tuyeres in the wall of the cupola and because of wall effect.

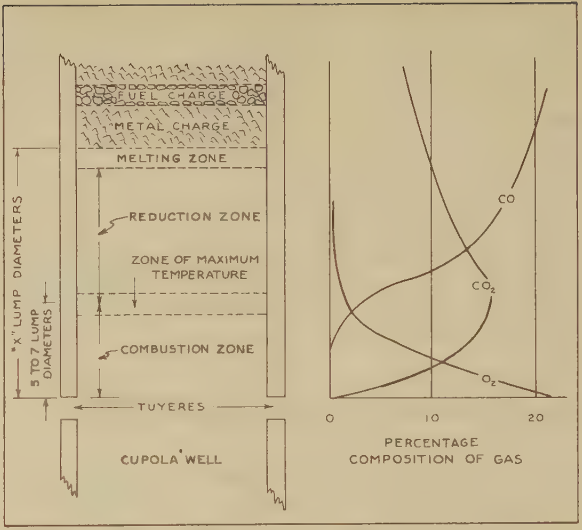

FIG. 1 - Idealized diagram representing conditions in a typical cupola fuel bed.

In the idealized case, the distance above the tuyeres ("*x*" lump diameters) at which fuel bed temperature is reduced to approximately 2150°F, the melting range of the iron, will be a function of the blast rate and of the reactivity of the fuel. This distance is of considerable importance to cupola operation, as it is the height at which the bed (initial layer of fuel) should be built and maintained. It is also of considerable importance in that the distance between this zone and the tuyere level is that in which the metal is superheated above melting temperature. The length of this zone influences the degree of superheat, and hence, the temperature of the metal obtained from the cupola.

The reduction zone and, therefore, the superheating zone may be lengthened by increasing the blast rate and thus reducing the time of contact; by increasing the size of the fuel and thus decreasing the surface area per unit of carbon; or by using a fuel having a lower reactivity in the temperature range from 2150° to 3000°F. It may be shortened by reducing the blast rate, by decreasing the size of the fuel, by increasing the reactivity of the fuel or by permitting the introduction of water vapor in the air.

The shape of the gas composition curves, illustrated in fig. 1, below the zone of maximum temperature (maximum CO_2) will change but slightly with change in blast rate, reactivity and water vapor content of the air although there will be a slight shift in location of the maximum temperature zone due to the influence of endothermic reactions (2) and (3). Above the zone of maximum temperature, marked changes in the shape of the CO_2 and CO curves are to be expected depending upon all three factors, and when water vapor is present a curve for hydrogen should be added.

Above the meting zone, heat is extracted from the gases by the downcoming fuel and metal charges which in turn are preheated to melting temperature. In the process of being preheated the fuel loses most of any volatile matter and moisture that it may contain. In this section of the cupola the oxygen concentration is quite low (unless serious blowholes or channelling occur) and the volatile matter escapes from the shaft unburned. In comparing the useful heat available from different fuels, therefore, a more reliable basis of comparison than the generally used calorific value may be obtained by using the relationship

$$\frac{(\text{pct fixed carbon as fired})}{(100)} (14{,}500) =$$

Available heat in Btu per lb of fuel charged.

This factor, however, represents only the heat available and does not tell how efficiently it is used.

Physical Factors

There are a number of factors other than the chemical reactions which influence the performance of the cupola. Blast penetration is of primary importance. As pointed out in the discussion of reaction (1), the oxygen entering in the blast is consumed in passing a distance of from 5 to 7 lump diameters of fuel. Since the blast in a cupola is introduced through ports or tuyeres in the wall of the cupola the size of fuel selected for a given cupola should be at least 1/14 the diameter of the cupola and preferably about 1/12. If a smaller size fuel is used, the oxygen will not penetrate to the center of the cupola and a lower temperature reduction zone at the center of the bed will result. The molten iron passing through the center section will then acquire less superheat and will lower the average temperature of the metal.

Fuel bed resistance is frequently an important factor in cupola operation. Attempts to operate the cupola at appreciably higher than designed capacities, or to use smaller sized fuel, may result in pressures against which the commonly used centrifugal blower is incapable of delivering the required volume of air. Poor quality fuels that break down appreciably in size due to thermal or mechanical shock also produce increased fuel bed resistance which may result in pressure problems, as may also the use of fuel containing appreciable quantities of small sized material. Unusually dirty scrap is another source of fuel bed resistance.

The resistance to gas flow in the cupola (roughly proportional to windbox pressure) is primarily a function of the average size of the fuel and of the gas velocity. Usually the metal charged is appreciably larger than the fuel and influences fuel bed resistance but slightly except in cases where it tends to compact the bed due to its weight. Under any specific set of conditions the pressure drop through a fuel bed can be calculated with a fair degree of accuracy knowing the size of all the materials, the percentage of voids, the temperature and composition of all the gases passing through the bed and their velocity. For practical operation of the cupola, such involved calculations are unnecessary since it is usually sufficient to know what factors influence resistance and how they can be modified.

TABLE I

Screen Analysis of Roughly Handled Fuel, Originally Sized to 4x3 in.

Fuel Size in Inches	Pct Present
4x3	82.5
3x2	5.5
2x1	5.8
1x½	2.7
Less than ½	3.5

As a rough approximation, for properly sized fuels in the range normally employed in cupolas, and at constant blast velocity, the pressure drop through the bed is inversely proportional to the square of the average diameter of the fuel and inversely proportional to the fourth power of the voids. For a given cupola fuel the percentage of voids in the bed will remain essentially constant with change in size. Different fuels, however, will pack in such a way as to produce different percentages of voids; thus anthracite packs to a denser bed and exhibits only 45 to 47 pct voids as compared to 53 to 55 pct voids for byproduct coke. Hence, other conditions being constant, a given size of anthracite may be expected to exhibit nearly twice the fuel bed resistance of coke. Similarly, changing the size of the same fuel from an average of 4 in. to an average of 3 in. will approximately double the fuel bed resistance, other conditions remaining constant.

Although no general relationship can be offered for estimating the increase in bed resistance resulting from the use of fuel containing or producing appreciable quantities of size degradation products, the increase may be appreciable. For example, as a result of rough handling, a fuel originally sized to 4x3 in. had the screen analysis shown in table I. This composite fuel showed an increase in fuel bed resistance, in a nonignited bed, of approximately 50 pct. In a burning fuel bed, the increase in resistances would undoubtedly have been somewhat lower because the finer sizes responsible for most of the resistance would be burned first. Removal of the less than 1-in. material would have reduced the increase to negligible proportions—about 5 pct.

For a given size and type of fuel, the fuel bed resistance is approximately proportional to the square of the gas velocity through the bed, which for a given cupola is also proportional to the blast volume. A decrease in blast volume of only 30 pct is sufficient to decrease pressure drop through the bed to about half the original value.

If lack of air volume due to high windbox pressures is causing difficulty, there are several possible solutions. By forking or screening the fuel, the less than 1-in. material will be reduced to negligible proportions and, if an appreciable quantity of this material was originally present, pressure will be reduced materially. A larger size fuel may be used within the limits discussed in the section on wall effect. Or the velocity of the gases through the cupola may be reduced by increasing the inside diameter since, especially in small cupolas, a one or two inch change in diameter can make a significant difference. With the same air volume, increasing a 30-in.

lining to 31-in. cuts the pressure drop by about 14 pct.

Because of the relationship between the shape of the fuel and the contour of the wall, a greater percentage of voids always occurs in a zone about one fuel diameter deep along the walls of any container. This increase in voids causes lower resistance to gas flow and channelling of the gases along the walls. This phenomenon is usually expressed as the wall effect factor (that fraction of the resistance of a bed of infinite diameter, exhibited by the actual bed under study). The wall effect factor is a function of the ratio of lump diameter to container diameter. For a ratio of 1 to 12 the factor is 0.7 and for a ratio of 1 to 6 it is 0.6. Thus as the ratio of fuel size is reduced, a greater percentage of the gases bypass the bed and travel up along the walls.

The Melting Process

In operation, metal and fuel in fixed proportions are charged into the cupola. In passing down the shaft to the melting zone, the charges are preheated by the hot upward flowing reaction gases so that by the time they arrive at the melting zone, fuel and metal are at substantially the temperature of this zone. In the melting zone, a phase change occurs which extracts heat from the cupola, the amount extracted depending principally upon the composition of the metal charge. The heat of fusion of pig iron is 84.6 Btu per lb and for gray cast iron, 41.4 Btu per lb. As most metal charges consist essentially of a mixture of these two materials, the heat extracted due to the phase change will usually lie between the two figures. Molten iron trickles down through the incandescent fuel and acquires superheat. As this occurs, another phase change—the formation of slag—takes place and extracts additional heat from the bed. The amount of heat involved is variable depending upon the composition and quantity of the ash and inorganic impurities present, and upon the amount of limestone or other flux used. Although the heat extracted per lb of slag may be quite high—about 550 Btu per lb—the heat extracted by slag formation in terms of metal produced is generally only of the order of 25 to 35 Btu per lb.

Although major variations in the composition of the metal and in the nature of the slag forming material cause changes in the overall results, definite relationships exist between melting rate, metal temperature, blast rate and the metal to fuel ratio for any given set of conditions. No matter what the ratio of metal to fuel introduced into the cupola it is known from study of the chemical reactions that in any given cupola a stabilized condition dependent upon the rate of air supply will be established. It is also apparent that the fuel introduced with the metal charges will be consumed in melting and superheating these charges. If the bed height of the original fuel is not that which conforms to the air rate for the size and reactivity of the fuel used, the bed will either burn down or build up to the correct level over a period of time during which the melting rate or metal temperature will continuously change until the stabilized condition is attained. Thus under stable conditions in a given cupola and at a fixed air rate and metal to fuel ratio, there is one and only one melting rate and metal temperature for any particular fuel. If either air rate or fuel ratio is changed during the operation, a new set of conditions will be established.

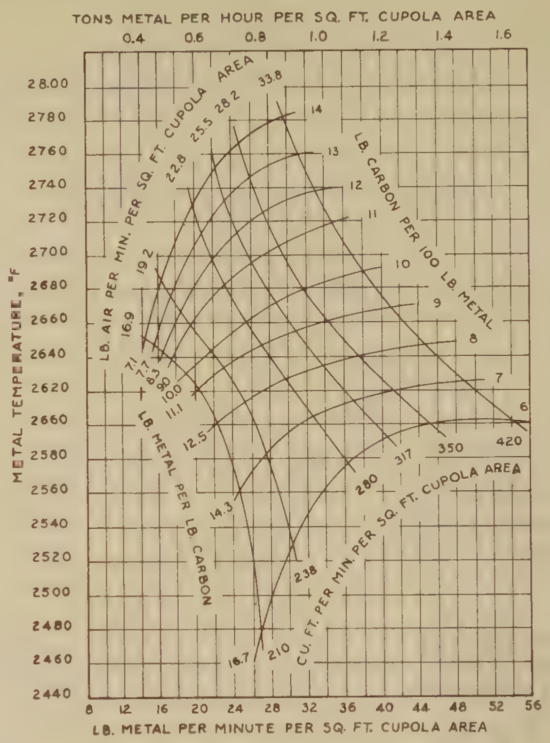

FIG. 2 - Relationship between metal temperature and the melting rate for various blast rates and fuel ratios.

The relationship between metal temperatures, melting rates, blast rates and ratios has been worked out for a uniform grade of foundry coke and a metal charge of typical composition and is reproduced in fig. 2. This relationship is based on data secured in a cupola lined to 21½ in.; hence, a slight correction should be made when the data are applied to the performance of larger cupolas, since in general, radiation and conduction losses decrease slightly as the diameter of the cupola increases. The effect of increasing cupola size is reported to be an increase in metal temperature of roughly 1°F for each 1-in. increase in diameter.

Similarly, marked differences in the reactivity of the fuel will produce a shift in the position of the diagram with respect to the metal temperatures. With fuel of lower reactivity, the heat extracted by the endothermic reactions is reduced and higher metal temperatures should result. Unfortunately, few reliable data are available on the reactivity of various types and grades of fuel over the temperature range of interest in cupola operation, and no detailed correction factors can be given.

Changes in the quantity of water vapor carried in the air blast will also tend to shift the position of the diagram. Other conditions remaining constant, the endothermic nature of the steam-carbon reaction will tend to reduce the temperature of both the combustion and reduction zones of the cupola and results in a decrease in metal temperature.

When melting metal charges containing unusually high percentages of pig iron, or appreciable quantities of steel scrap (heat of fusion 181.1 Btu per lb), the heat extracted in the phase change from solid to molten iron will be materially increased. Less superheat will be produced under equivalent conditions and metal temperature will be reduced. A large increase in ash or the need for a much higher than usual quantity of flux will also tend to reduce slightly the metal temperature, but the decrease will be less than that of several of the other factors mentioned.

In addition to the function of the fuel as a source of heat, carbon and sulfur from the fuel enter into the metallurgical reactions. Similarly, minor elements present in the metal charge enter into combustion reactions. It should be mentioned that sulfur is an undesirable constituent of fuel and that although the sulfur content of the metal can be controlled to some extent by the use of additional flux or by sodium carbonate additions to the molten metal, such practices increase operating costs. For foundry fuels, sulfur contents over one are generally considered unsatisfactory.

. . . NEW BOOKS . . .

"Let's Be Human," by J. L. Beckley, drawings by R. R. Baldwin. Cartoons and text present the art of handling people with emphasis on foreman-employee relationships. The presentation is designed to make the book particularly suitable as a giveaway to foremen. Duell, Sloan & Pearce, 270 Madison Ave., New York 16. $2.50. 122 p.

* * *

"Molybdenum: Steels, Irons, Alloys," by R. S. Archer, J. Z. Briggs and C. M. Loeb, Jr. Varied applications of molybdenum as an alloying element are described in this book. A wide range of materials from wrought to cast steels and from cast iron to nonferrous alloys is covered. Information on many specialty applications such as exhaust valves and elevated temperature springs has been included. 391 p. Gratis. Climax Molybdenum Co., 500 Fifth Ave., New York.

* * *

"Job Evaluation," by J. L. Otis and R. H. Leukart. Book describes the principles of job evaluation as a basis for wage and salary administration. Job evaluation systems, establishment of the wage curve and pay structure, and the relationship of job evaluation to union negotiations are discussed. Prentice-Hall, Inc., 70 Fifth Ave., New York 11. $6.65. 473 p.

* * *

"Rarer Metals," by J. DeMent and H. C. Dake. Basic data on twenty rarer metals, excluding the metals of the rare earths, are correlated in this text. Applications of the elements are discussed and bibliographies of the technical literature on each are included. 392 p. $7.50. Chemical Publishing Co., Inc., Brooklyn 2.

* * *

"Analytical Methods for Aluminum Alloys." Chemical, photometric and spectrographic methods for the quantitative determination of all elements commonly found in aluminum alloys are described in this book. A section on methods for sampling ingots is included. 103 p. Aluminum Research Institute, 111 W. Washington St., Chicago 2.

"Foundry Cost Manual." Cost manual for foundry clerical simplification lists more than 200 items of foundry cost followed by the department and title of the account to which each item should be charged. Opposite the item is a blank space for use by individual foundries for entering their own ledger account numbers. Gray Iron Founders' Society, Inc., Public Square Bldg., Cleveland. $1.00.

* * *

"Seventy-five Years of Progress in the Mineral Industry." History of the mineral industry from 1871 to 1946 is described and topics ranging from mining geology to the applications of atomic energy are covered in this volume. Theoretical, economical, technological and statistical information is given and the proceedings of the 75th anniversary meeting of the AIME are included. American Institute of Mining & Metallurgical Engineers, 29 W. 39th St., New York. Members, $4.00. Nonmembers, $6.00. 817 p.

* * *

"Metallurgical Materials and Processes," by John Elberfeld. Text reviews the general field of metallurgy with sections on mechanical properties, grain structure, equilibrium diagrams, heat treatment, welding metallurgy, powder metallurgy, testing and other subjects. 188 p. $5.00. Prentice-Hall, Inc., 70 Fifth Ave., New York 11.

* * *

"Metal Powder Report." Monthly editions cover literature and patent applications in the field of powder metallurgy, with especial attention to high temperature materials. Subscription rate, $15.00 per year. Powder Metallurgy, Ltd., Commonwealth House, 1-19 New Oxford St., London, W. C. 1, England.

* * *

"NFPA Handbook of Fire Protection," edited by R. S. Moulton. Tenth edition of handbook gives information of fire prevention and protection. Wartime fire protection developments are described. 1500 p. $9.50. National Fire Protection Assn., 60 Batterymarch St., Boston 10.

New Wire Fatigue Testing

By F. A. VOTTA, Jr.
Engineer, Apparatus Div.,
Hunter Spring Co.,
Lansdale, Pa.

Fatigue information is considered the most reliable means for predicting wire life in dynamic service. A simplified and rapid, yet highly accurate method for obtaining fatigue strength and endurance limit values to serve as quality indexes, is described in this article. Of interest to both the wire manufacturer and consumer, the method is said to make possible production control and material acceptance on the basis of modern statistical methods.

A NEW development in rotating-beam fatigue testing machines promises to take the fatigue testing of small diameter wire out of the physicist's laboratory and put it on the work bench of the routine inspector. The key to the new-type instrument, developed some years ago by Hunter Spring Co., Lansdale, Pa., (formerly Hunter Pressed Steel Co.) and recently refined, patented,* and offered for commercial use, is the looping of a sample of predetermined length through a complete 180 degrees so that the bending stress (at the peak of the loop) can be perfectly predicted, simply calculated and brought to as great a value as desired for rapid specimen failure.

Accordingly, this method is capable of greater fatigue testing speeds than heretofore obtainable. For example, 0.020-in. plow steel wire stressed to 125,000 psi can conveniently be subjected to 36,000 alternate bendings and complete failure in a matter of 10 min. Even stock of diameters measured in a few thousandths of an inch can be stressed so as to fail in a matter of minutes. By formerly used methods, reliable fatigue test results could not be obtained for wire sizes under 0.020 in.—and even the larger sizes could not be reliably stressed at high enough levels for speed testing.

The testing method employed by the new apparatus is so simple that inspectors without experience in operating physical testing equipment can perform all the necessary calculations, set up for a test, and complete it without special training. The possible errors of the method are so small that accuracies within 1 or 2 pct, based on theoretical calculations, are obtained in routine inspection-bench use.

A single instrument can be used for testing a wide range of wire diameters. The unit shown in fig. 1, for example, is adaptable to wire from 0.005 to 0.030 in.; another model of convenient bench size could extend this range up to wire of 0.1 in. diam. It is significant that there are no fine adjustments to be made, no special precautions in the maintenance and handling of the machine involved; also, the unit can be plugged in electrically and used anywhere in the plant.

Because, by the method to be described, single fatigue tests of wire specimens at predetermined high stresses can be completed in a matter of minutes, it is possible for wire manufacturers to control chart wire drawing processes according to modern statistical methods of quality control. Consumers, too, can make use of fatigue tests as a basis for material acceptance.

It is even practicable to test enough samples in a short time to plot a frequency distribution curve of fatigue lifes at a given stress for different samples, and thereby study the variation of fatigue characteristics throughout a wire lot.

Further, a complete research study of number-of-cycles-to-failure v. stress can be made and plotted within a few days, even though some of the samples may be sufficiently lightly stressed to be below the endurance limits and not fail even after 10 million reversals. Figs. 2 and 3 are examples of such complete S-N studies on steel and beryllium copper lots, respectively. In these two cases 20 and 21 samples, respectively, were run either to failure or to 10 million cycles.

One of the most important aspects of such rapid and simplified fatigue testing is the possible use of fatigue strengths and endurance limits as quality indexes.

Fatigue information is, without question, the most reliable means of predicting wire life in dynamic service. It shows up surface defects (nicks, scratches, etc.) with extreme sensitivity: However, fatigue strengths cannot easily be deduced from tensile strengths, or other com-

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* *Patent No. 2,435,772 "Method and Apparatus for Testing Wire," P. C. Clarke, Feb. 10, 1948.*

Method

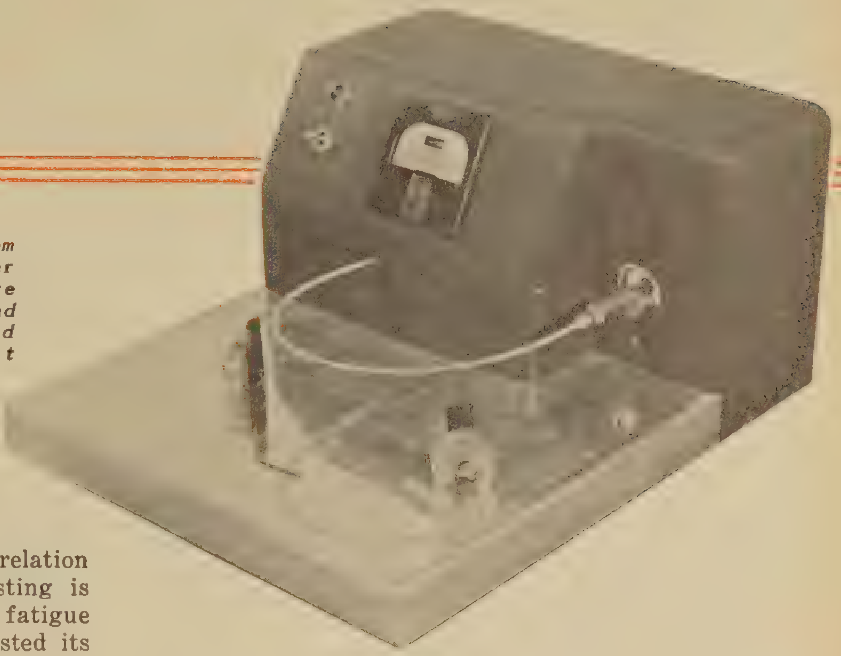


FIG. 1 - The new Hunter rotating beam fatigue testing unit for small diameter wire -- this model will accommodate wire sizes from 0.005 in. to 0.03 in. diam and any reverse bending stress up to yield point of the material. The testing unit is shown fatiguing a coil spring.

monly measured characteristics, the correlation is too broad and unreliable. Direct testing is therefore the only practical means. If fatigue can be sufficiently, easily and quickly tested its worth as a quality control characteristic is significant.

It is even likely that the fatigue characteristics of small wire may be the basis of: (1) design involving wire forms and parts (such as springs), (2) large volume wire purchasing, and (3) large-scale wire production.

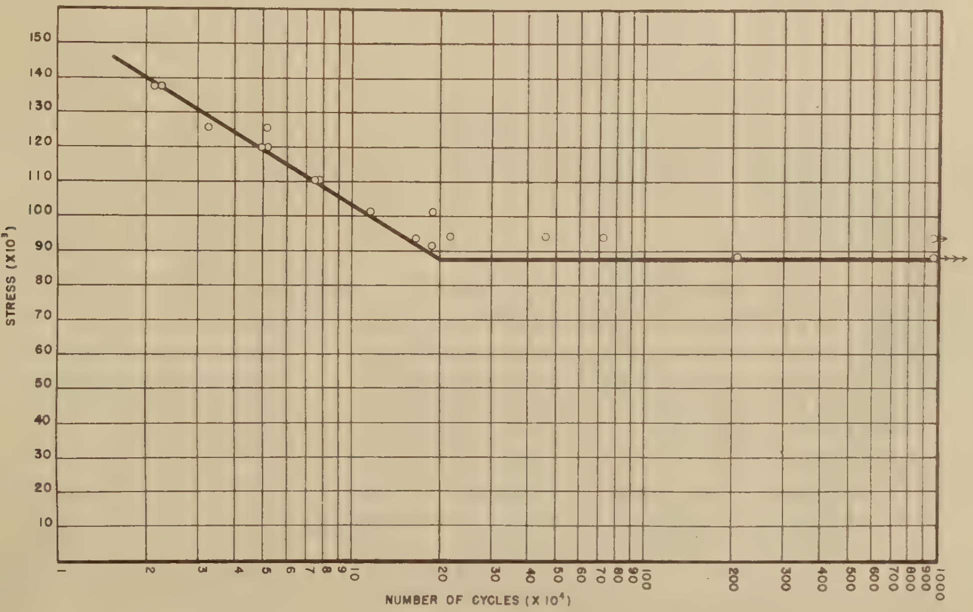
The influence of better testing methods upon engineering safety factors, whether provided by designer or producer, to insure adequate life is obvious. If, for example, it is known that life will exceed a specified number of cycles, there is no need to specify heavier construction than actually required, which would be the case if the life characteristic could not be accurately determined.

Description and Method of Use

The testing instrument consists essentially of a motor-driven chuck and a bushing-bar with many holes (each a bushing) to position that end of the sample which is not clamped in the chuck.** The motor which drives the chuck is, of course, synchronous so that an electric clock mechanism can be used to count the revolutions accurately. Two supporting guides hold the specimen in a horizontal plane near, but not in, the region of maximum stress. They prevent vibration, and, as in fig. 1, are mounted on Alnico magnets so that they may be quickly but securely positioned anywhere on the steel apron of the instrument.

** *A recent improvement provides a bushing hole with vernier lateral control. The bushing is carried in a slot (in the same location as the series of holes in the older instrument shown in fig. 1) and adjusted therein by vernier methods.*

FIG. 2 - A representative series of 20 fatigue tests (complete S-N analysis) conducted on 0.020 in. diam plow steel wire. The total time required to complete all 20 tests (many to over 10 million cycles) is less than 9 days.



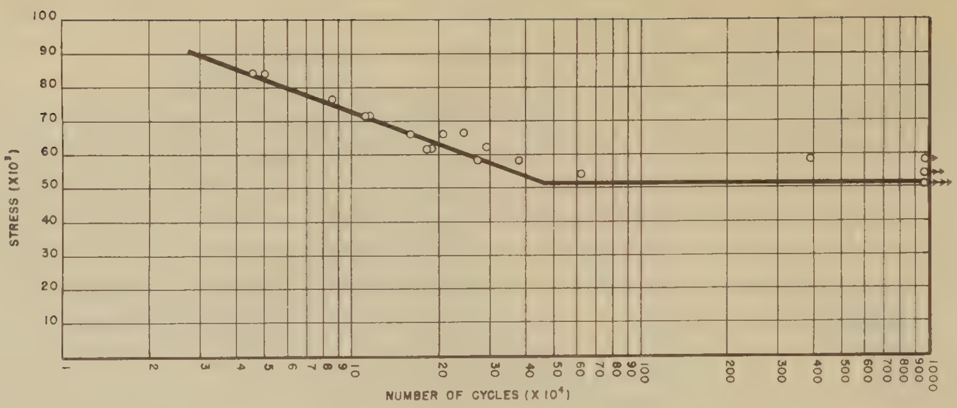


FIG. 3 - A representative series of 21 fatigue tests conducted on 0.022 in. diam beryllium copper wire. The total time required to complete all tests was only 13 days.

The various holes in the bushing-bar provide sufficient adjustment to bend the specimen with the proper distance between the length of the arch (or loop), so that the axis of the chuck and axis of rotation of the loose wire end in its bushing are exactly parallel.

A test is made by: (1) calculating the sample length L and the chuck-bushing distance C appropriate to the testing stress s desired in the wire to be tested (its modulus of elasticity E and diameter d being known); (2) cutting such a length, clamping it in the chuck, inserting the other end in the proper bushing, and locating the supporting guides; (3) turning on the motor; and (4) waiting for the break.

If, after fracture has occurred, the two pieces are not of the same length (meaning that the point of fracture was not at the point of maximum stress), the test is not lost—because the actual stress at the point of fracture can be readily calculated by measuring the location of the break as a percentage of total specimen length away from center. The following is an exact interrelationship between the bending stress at any point off the center of the wire (the apex of the loop) in terms of the maximum stress at that center, and the distance away therefrom measured in terms of percent of total sample length:

	2½	5	7½	10	12½	15	17½	20	22½	25
Stress Pct. of Max.	99.6	98.3	96.2	93.3	89.8	85.6	80.9	75.7	70.2	64.4

The instrument is so arranged electrically that the specimen itself is in the driving circuit; therefore, the test is automatically terminated, and the counting clock stopped when the fracture occurs.

Theory and Formulation

One of the important disclosures of the new method is that a look, formed by an elastic length held freely so that the axes of the specimen at the points of retention are exactly parallel, assumes a shape in which: (1) the length of the loop is 2.19 times the base, (2) the height of the arch is always 0.835 times the base, (3) the minimum radius of curvature occurs at the apex of the arch and is exactly 0.417 times the base, and (4) the bending stress at the point of minimum curvature bears a simple reciprocal linear relationship to any of the four physical dimensions (length, height, base, minimum curvature).

The following formulas express the exact relationships. The derivation of these formulas is outlined in fig 4.

$$C = \frac{1.198Ed}{s} \qquad R_{min} = 0.417\ C$$

$$h = 0.835\ C$$

$$L = 2.19 \times C = \frac{2.62Ed}{s} \qquad P = \frac{0.141Ed^4}{C^2}$$

where E = Young's Modulus, d = diameter of wire, C = chuck-to-bushing distance, h = height of loop, L = length of wire external to bushing and chuck, R_{min} = minimum radius of curvature, P = bushing load or lateral force at the chuck, and S = bending stress.

Due to the simplicity with which sample lengths and chuck-to-bushing distances are calculated from the desired test stress, and because of the construction of the apparatus, the errors of the method are extremely low—well within 1 pct (theoretical) if care is exercised in setting up the test.

It is significant, for example, that a simple hole is an adequate bearing and that the same hole can be used for testing wire of all sizes. Fitting is no problem; the wire merely bears on one side of the hole. Further, an error of as much as 0.050 in. in a 5-in. chuck-to-bushing distance only involves a 1 pct error in the test stress, because of the linearity of the relationship.

Operator's errors are reduced to the measuring of sample length and determining chuck-to-bushing spacing.

With the simplest of supports to keep the loop horizontal and prevent vibration, no detectable influences of vibration have been noted in the thousands of tests conducted at Hunter by the method.

As regards accuracy, the significant distinctions from previously used methods of fatigue testing wire[1] (quite apart from convenience, speed, and height of stress obtainable) are: (1) elimination of the necessity of submerging the wire in an oil bath to suppress vibration, (2) the simplicity of stress calculation without any assumption of small slopes in the derivation, and (3) the usability of loose bushing holes.

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[1] *J. N. Kenyon, "The Rotating Wire Arc Fatigue Testing Machine for Testing Small Diameter Wire," Proc. ASTM, vol. 35, Part 2, 1935, p. 156.*

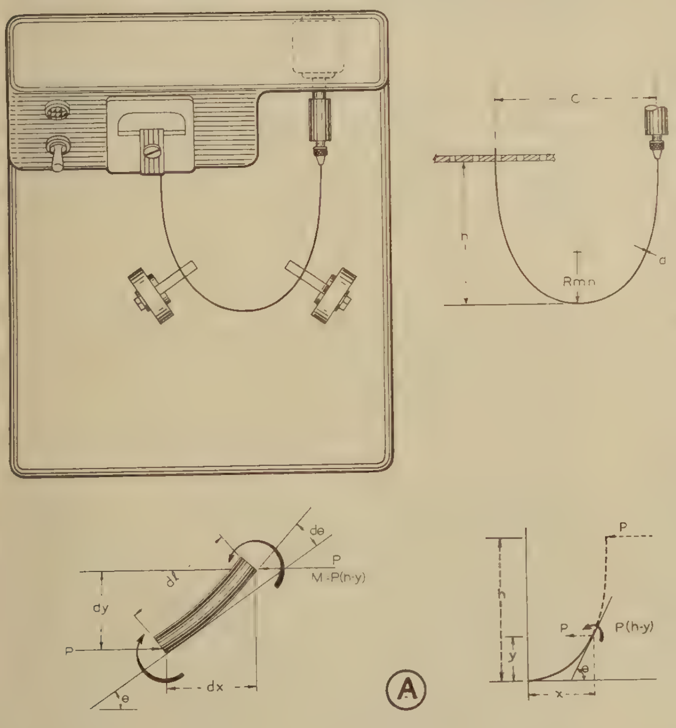
Possibilities for Usefulness

Suppliers of wire for springs, and makers of springs, will find the testing method very useful. Hunter Spring Co. has used it for many years to control wire quality and manufactured spring life. Because there is an exact linear correlation between fatigue under reverse bending stress and fatigue under shearing stress (as experienced in the operation of coil springs), fatigue strengths and endurance limits established by this new technique give true spring life indications.

An important point is that the method is adaptable to corrosion fatigue testing, where the sample during test is immersed in a corroding medium and the influence of that corrosion upon fatigue studied. It would also be a simple matter to operate such a simple apparatus at elevated temperatures, say within an oven or a furnace, and conduct valuable research on life characteristics of products under high-temperature service. Perhaps of equal importance would be studies made at subzero temperatures.

Many tests have been conducted which suggest other opportunities for use of the apparatus in research work. In one case the effect of electroplating on fatigue life was studied. The curve given in fig. 3 was run as part of a study of the ratio of endurance limit to ultimate tensile strength, as well as in connection with the study of the effect of various heat treatments upon the beryllium-copper wire.

The author, however, feels that the most far-reaching value of more rapid fatigue testing can be in terms of acceptance testing and inspection. Load testing, dimensional testing, and all manner of other quality testing today is done more and more by statistical methods, employing the frequency-distribution curve and the control chart. Perhaps the fatigue testing of small wire is entering the same domain.



From the formulas for the elastic curve of a bent beam and the radius of curvature of any curve:

$$d\theta = \frac{M}{EI}\,dl = \frac{P(h-y)}{EI}\,\frac{dy}{\sin\theta}$$

Which when integrated (from the apex of the wire loop to the chuck) reduces to:

$$y = h(1-\sqrt{\cos\theta})$$

Whence:

$$R = \frac{h/2}{\sqrt{\cos\theta}}$$

$$x = \frac{h}{2}\int_0^{\theta}\sqrt{\cos\theta}\,d\theta$$

$$c = 2x_{max} = h\int_0^{\pi/2}\sqrt{\cos\theta}\,d\theta$$

$$l = \frac{h}{2}\int_0^{\theta}\frac{d\theta}{\sqrt{\cos\theta}}$$

$$L = h\int_0^{\pi/2}\frac{d\theta}{\sqrt{\cos\theta}}$$

$$P = \frac{2EI}{h^2} = \frac{\pi}{32}\cdot\frac{Ed^4}{h^2}$$

$(I = \frac{\pi d^4}{64}$ for a circular section)

and

$$S = \frac{Ed}{2R} = \frac{Ed}{h}\sqrt{\cos\theta}$$

$$S_{max} = \frac{Ed}{h}$$

Solutions to the above integrals can be accomplished by expressing them in terms of Elliptic Integrals (for which tables are available) which are defined as follows:

$$F(K,\phi) = \int_0^{\phi}\frac{d\phi}{\sqrt{1-K^2\sin^2\phi}}$$

$$E(K,\phi) = \int_0^{\phi}\sqrt{1-k^2\sin^2\phi}\,d\phi$$

where:

$$K = \sin\frac{\theta_{max}}{2} = \frac{1}{\sqrt{2}}$$

$$\sin\phi = \frac{1}{K}\sin\frac{\theta}{2} = \sqrt{2}\sin\frac{\theta}{2}$$

$$\cos\theta = \cos^2\phi$$

which when integrated from $\theta = 0$ to $\frac{\pi}{2}$ give:

$$\int_0^{\pi/2}\sqrt{\cos\theta}\,d\theta = 1.1978$$

$$\int_0^{\pi/2}\frac{d\theta}{\sqrt{\cos\theta}} = 2.622$$

By substitution, then, the formulas and relationships in the text follow.

Ⓑ

FIG. 4 - Derivation of formulae associated with the design of the Hunter fatigue tester.

(A) Diagram of the principal parts and arrangement of the new tester showing the nature of the loop assumed by a wire freely held between bearings so that the sample ends are exactly parallel.

(B) Differential equations and their integration, originated and accomplished by the inventor of the method, P.C. Clarke, in collaboration with Dr. A.C. Bates of Lehigh University.

Standards for Magnetic

Pointing to the lack of standards for magnetic particle inspection, the author attempts to outline the fundamental concepts upon which acceptcnce and rejection of parts should be based. The two principal types of defects, cracks and inclusions, are discussed (1) as to cause and effect, (2 means of identification under magnetic inspection and (3) metallographic examinaton. A listing of nine classifications into which inspection standards are grouped in the aircraft industry is also given, supplemented with a photographic study illustrating the various classifications.

IN the many specifications for magnetic particle inspection and in published material on the subject, there are numerous examples of magnetic indications and microscopic cross-sections of these indications. However, standards for acceptance or rejection of parts with indications seem to be definitely avoided. This is due to a lack of understanding of the basic nature of the defect and its effect on the parent metal, or due to a lack of knowledge of the application of the part in connection with which an indication is involved.

There is sufficient information to establish standards for acceptance or rejection in many cases. Basically, there are two principal types of defects; cracks and inclusions. Cracks are classified by the method in which they are produced, that is hardening cracks, fatigue cracks, grinding cracks, etc., while inclusions and foreign material embedded in the parent metal. In steel, they usually consist of iron and manganese sulfides and iron oxides.

In the first part of this two-part article, THE IRON AGE, August 5, page 79 , the author discussed the important role played by magnetic particle inspection as a supplement to other testing procedures in the quality control of aircraft components and weld sections and presented methods for detecting various types of defects.—Ed.

Sulfides are uniformly distributed throughout the steel in the form of stringers, while the oxide inclusions are found on the surfaces of bar steel or forgings where the metal has been folded over and has trapped some of the surface oxides. Cracks, as found in magnetic inspection, are usually open to the surface of the material and follow a jagged pattern. The magnetic indication may be wiped off and the cracks can still be seen, once they have been located with magnetic particle inspection. Inclusions follow the direction of rolling and travel in a relatively straight line. On machined parts, the inclusion may or may not be seen after wiping off the magnetic indication, depending upon whether the inclusion was cut open in machining or whether it remains slightly below the surface. If an indication can be wiped off and is no longer visible, it is probably an inclusion which is seldom cause for rejection; but if the indication remains, it might be either an inclusion or a crack, the latter being always cause for rejection.

The question arises as to why cracks are always cause for rejection and inclusions are seldom cause for rejection. In fig. 1 is shown the sharp nature of the bottom of a crack which is conducive to the growth of the crack. In figs. 2 and 3 are shown cross-sections of inclusions found on large diameter tubular piston rods. Over ⅛ in. of material had been machined from the surface of the tubing used for these parts, the material having been ground and hard chromium plated. In one case, the plate covered over the inclusion.

Inclusions are generally thought of as rounded strings of foreign material running intermittently length wise of the material. The inclusion shown in fig. 3 has sharp corners and small fingers projecting out as sharp as cracks. Examiination of several inclusions at very high magnification dispells any belief that they are rounded particles. Therefore, it is necessary to look farther for an explanation of why cracks promote

Particle Inspection

By DONALD E. RODA
Chief Metallurgist, Pacific Div.,
Bendix Aviation Corp.
North Hollywood, Calif.

complete failure and inclusions do not.

Fatigue cracks start in the surface of sound metal at points of stress concentration. Due to the high stress and repeated loading, they gradually work their way across the part. The most common location of stress concentration is in a change in section. If a fatigue crack is found in a part taht has been in service, it was produced by a stress large enough to start failure and stresses large enough to complete the failure will be present if the part is put back into use. Heat treating cracks are usually quite deep, and they not only reduce the cross-sectio nof the part, but also fork and run at all angles to the part. Points of stress concentration are formed when they cross the path of stress in the part. Grinding cracks appear only in very hard surfaces (60 Rc or harder). These are the surfaces of cams or followers, where by their very nature the highest stresses are involved. Any cracks will lead to spalling or complete failure.

Inclusions in bar stock and tubing run lengthwise of the material, and no matter how hard one tries, it is almost impossible to load the surface of these materials transverse to the direction of the inclusions. It is the small size and definite location of inclusion longitudinal to the direction of rolling that make them seldom cause for rejection for aircraft components.

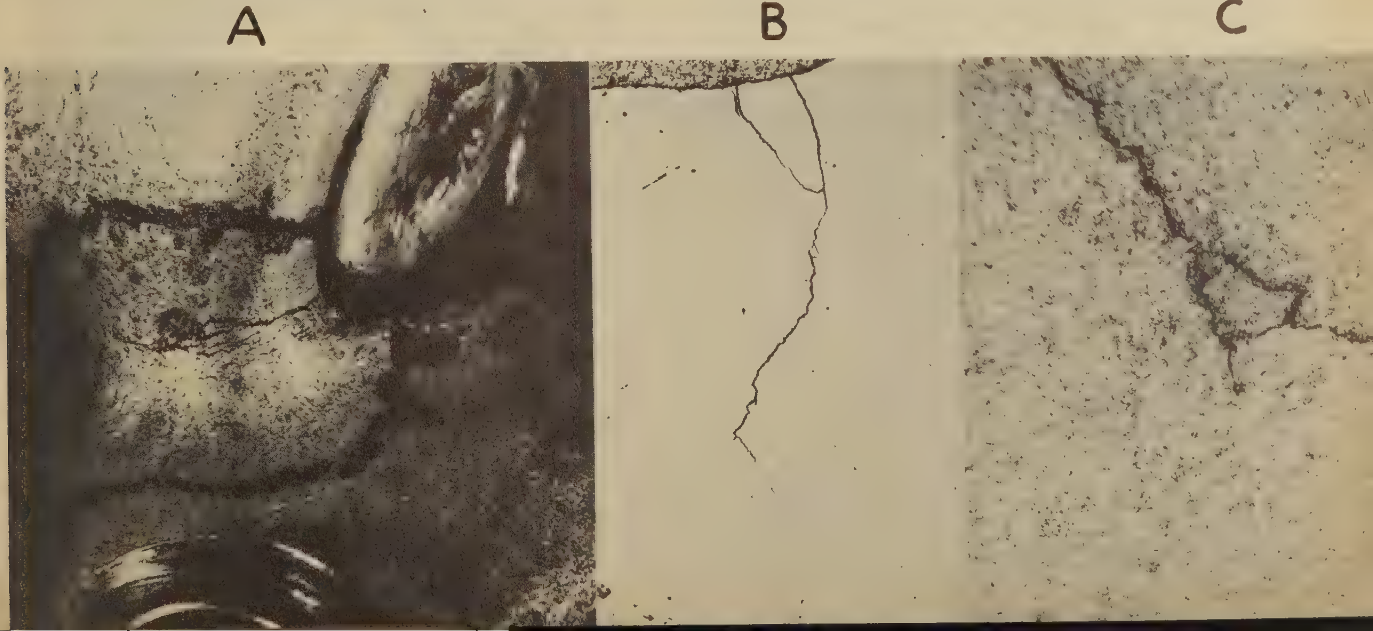
To cut a bolt transverse to the length of a bar of screw stock would be very difficult to do. Screw stock is high in sulfur and inclusions and the resultant bolt would be low in physical properties, especially in fatigue life. The inclusions would constitute cause for rejection if the bolt was cut transverse to the direction of rolling.

The standards for acceptance or rejection of parts with indications are grouped into different classifications.

(1) *Fatigue cracks* are always cause for rejection. In rebuilding an aircraft engine, a gun, or checking a landing gear strut, the parts might show clear-cut fatigue cracks, like those found in fig. 1, even in well rounded corners. They are characterized by a slightly jagged nature and a location of known high stress. Other fatigue cracks might not be so easy to recognize. No chances should be taken with fatigue cracks. If there is any question about magnetic indication representing a fatigue crack, the part should be rejected.

(2) *Tubing.* Magnetic indications on aircraft

FIG. 1 - Fatigue failure in latch pin housing. Reject. (A) shows the housing (actual size) with the magnetic indications outlined on both sides with crayon. (B) is an unetched cross-section which shows that the crack has progressed almost all of the way through the part. (C) is shown a view, 100X, of the end of the crack. For (C) the section was etched to show the base metal structure and the sharp nature of the bottom of crack.



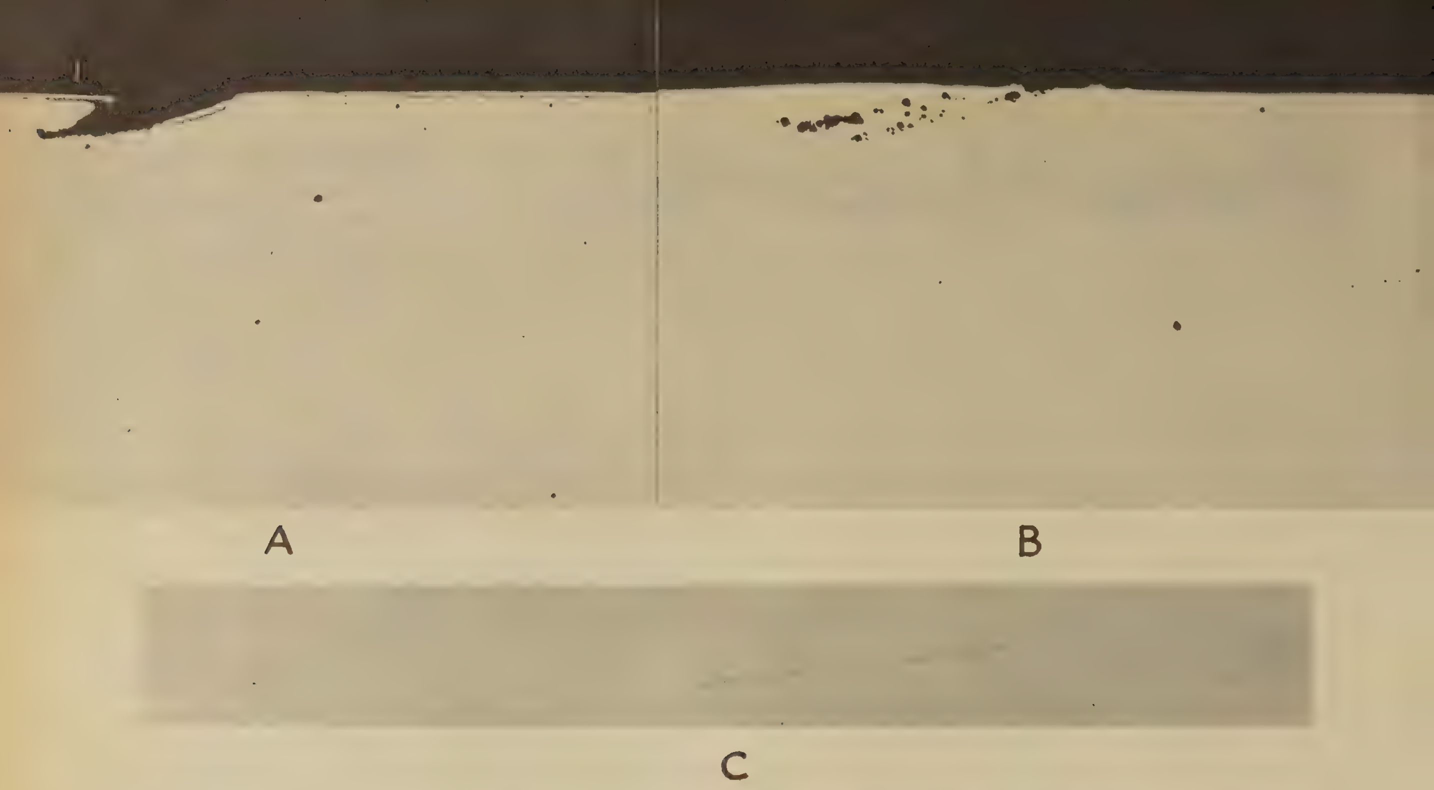


FIG. 2 - (A) represents an open indication in tubing at 50X. The chromium plate is deposited part way down into the flaw. Reject. (B) is the cross-section of a closed indication at 50X before plating. Accept. A scotch tape record of the latter indication is shown at (C), actual size.

mechanical tubing represented a difficult wartime problem. This tubing is usually of alloy steel, machined inside and out, or just on one side deep enough to remove surface defects. Actuating cylinders and struts are machined and honed on the inside to a mirror finish and the piston rods (tubular) are polished and hard chromium plated on the outside, and defects are strikingly apparent in magnetic inspection on these bright surfaces.

Cross-sectioning through one or two indications, and metallographic examination of the specimens, will soon tell whether or not they are inclusions. Inclusions always run at a slight angle to the tube revealing the twisting action in piercing the tubes. In figs. 2 and 3 are shown cross-sections through inclusions. If the indications do not break the surface as shown in one instance, they are not cause for rejection. If the inclusion is large enough it will be torn open in machining and leave a sharp edge like that found in fig. 2. Usually, the indications grow in length as they grow in size. Open indications would cut the rings and packing and are therefore cause for rejection. Open indications can be felt with the fingernail once they are located by magnetic particle inspection. The indication shown in fig. 3 would not be cause for rejection.

FIG. 3 - An unetched cross-section through a chromium plated piston rod shown at 100X. The black, jagged inclusion that caused this indication may readily be seen. The hard chromium plate on the surface of the part is visible and a few more inclusions farther down into the metal may also be detected.

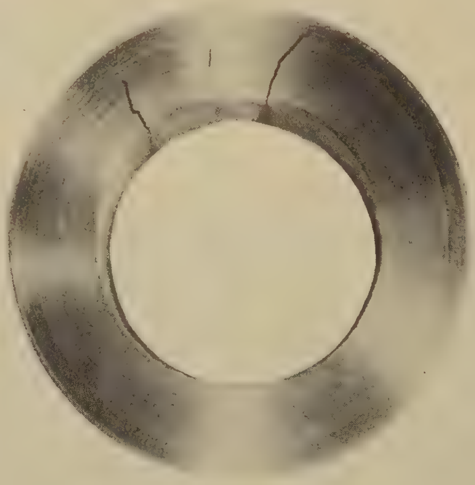


FIG. 4 - Internal cracks in alloy steel tubing. Reject. The tube size is ¾ in. OD by 0.156 in. wall and is shown enlarged approximately three times. The cracks are very noticeable on the turned ends of the tubing in magnetic inspection. Before magnetic inspection, the cracks were not visible.

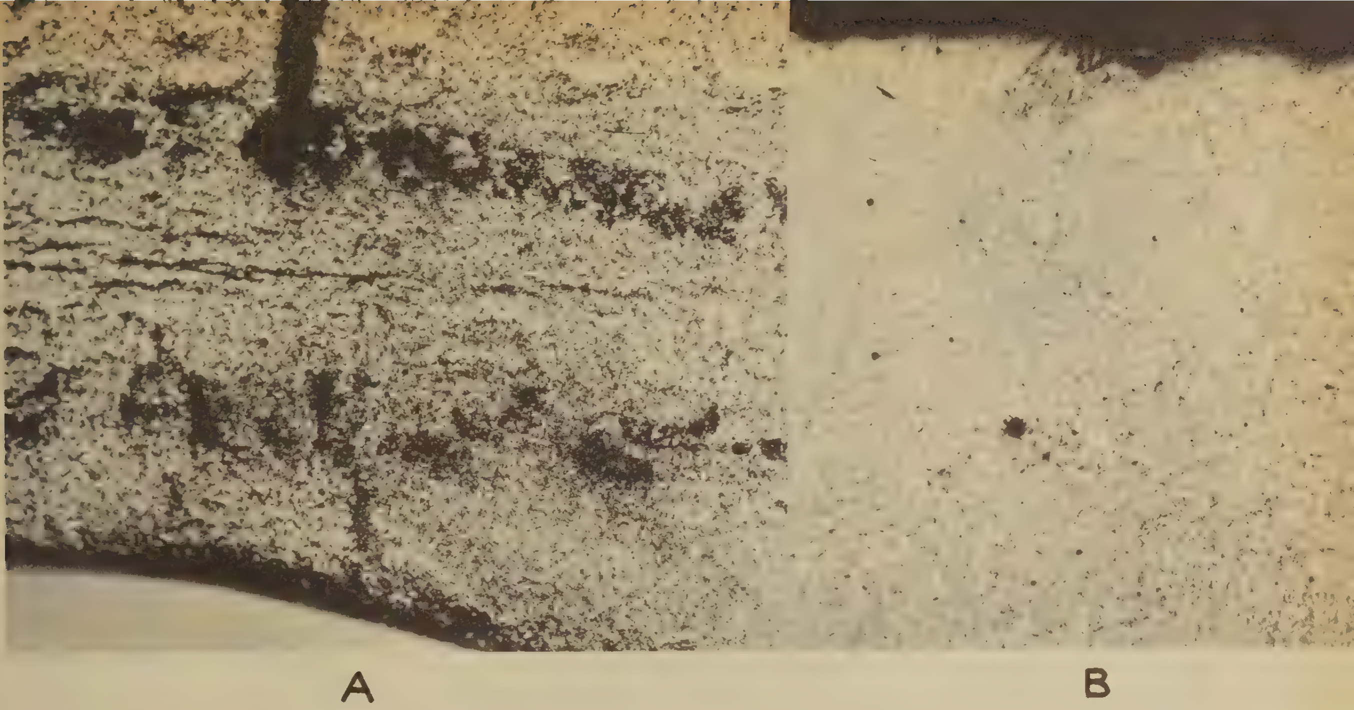


FIG. 5 - (A) is a photograph at 5X of indications on a forging. They are outlined on both sides with crayon marks and the location of the cross-section is also indicated by a crayon mark at right angles to the indication. (B) is a cross-section through the indication at 100X. Accept by grinding out these indications. This section is etched and also shows the tendency for decarburization of the surface of forgings.

The larger the size of the tubing, the larger the indications are apt to be. The smaller the size of the tubing, the finer the inclusions are drawn out. To have high quality tubing, the inclusions must be finely divided and uniformly distributed throughout the steel. To improve machinability one manufacturer of high quality electric alloy steel tubing (and bearings) holds sulphur to the high side of the limit. Many fine and very short indications are found in this material; however, the steel is of very good quality.

The quality of a definite heat of tubing may be easily checked by cutting samples from two lengths of the tubing about 18 in. long and turning the samples in steps down to the finished size of the cylinder or piston rod. The samples are magnetic inspected after each cut and indications should disappear after the proper amount of material has been removed. Usually, if the two samples are free of indications, the entire heat of steel will be satisfactory for use, or if heavy indications are found in cut after cut on the two samples of tubing, the remainder of the lot will give trouble.

In fig. 4 are shown internal cracks in small size alloy steel tubing in the as-received condition. These are definite cause for rejection and are best located by examining the ends of the parts in magnetic inspection. These flaws give a wide, faint indication on the surface of the tube and are not readily visible, however, a strong indication is obtained inside and on the ends of the tube. In the short time that elapsed between magnetizing the part and photographing it, the indications kept building up until they were several times the width of the actual flaws.

(3) *Forgings.* In the aircraft industry, many heat-treated alloy steel forgings are used for links and structural members that are not machined on all surfaces. These parts are best prepared for magnetic inspection by shot blasting.

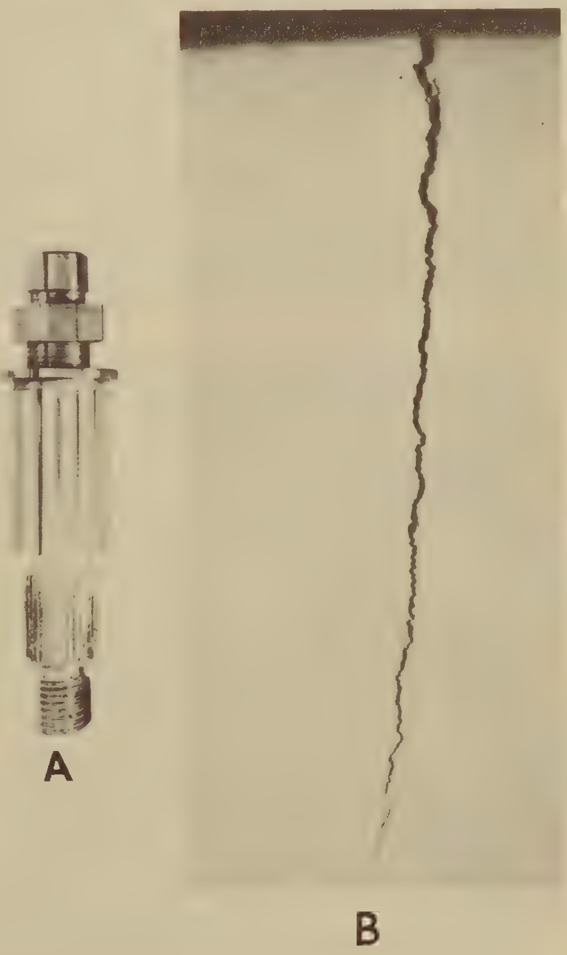
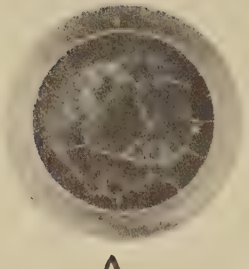


FIG. 6 - At (A) is shown a small part (actual size) with a hardening crack on the cam surface as revealed by magnetic inspection. Reject. (B) is an unetched cross-section through the crack at 50X.

In fig. 5 are shown a photograph of indications on a forging and a cross-section through this indication. It is easy to see that in this case the



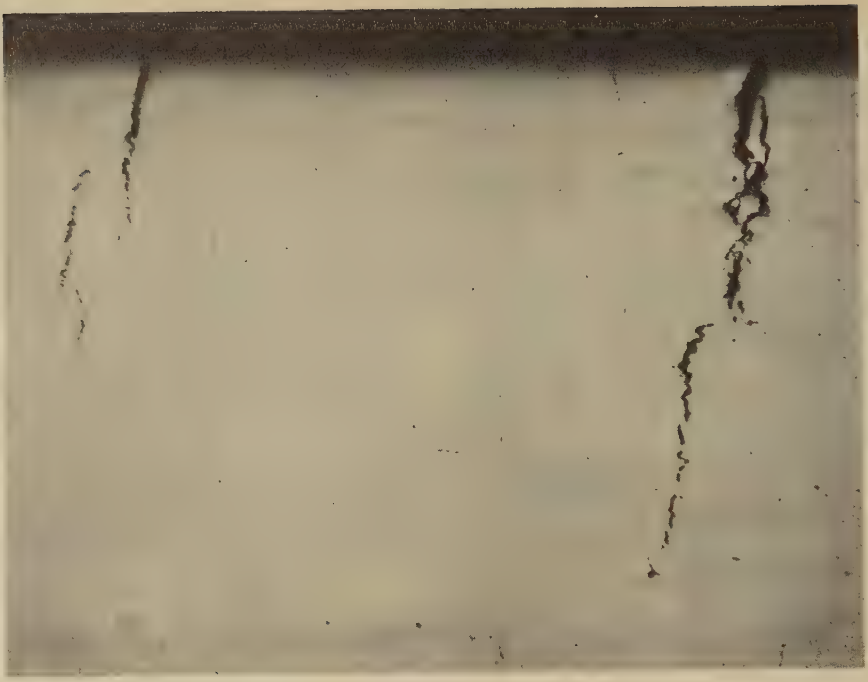


FIG. 7 - Above (A) is a photograph of magnetic indications on the end of a latch pin illustrating typical grinding cracks. Reject. (B) is an unetched cross-section through the cracks at 50X revealing their depth.

indications were caused by small surface roughness that would not be detrimental to the part but which is deep enough to hold the magnetic oxide. The best procedure to use in this type of work is to grind out any indications found on the forging surface with a hand grinder. Magnetic inspection after grinding should show the parts free of indication. Any cracks or indications that require deep grinding are cause for rejection.

(4) *Hardening Cracks* are always cause for rejection due to their deep nature and erratic path through a part. In fig. 6 is shown a typical hardening crack on the induction hardened surface of a cam along with a cross-section through the indication.

(5) *Grinding Cracks* are always cause for rejection. They occur on surfaces of high stress concentration and would promote fatigue failure and spalling. In fig. 7 is shown a typical example of grinding cracks on the end of a carburized hardened and ground latch pin. A cross-section through the cracks that usually do not go very deep is also shown.

(6) *Bolt and Nut.* Any cracks on bolts or nuts would be cause for rejection, and heavy in-

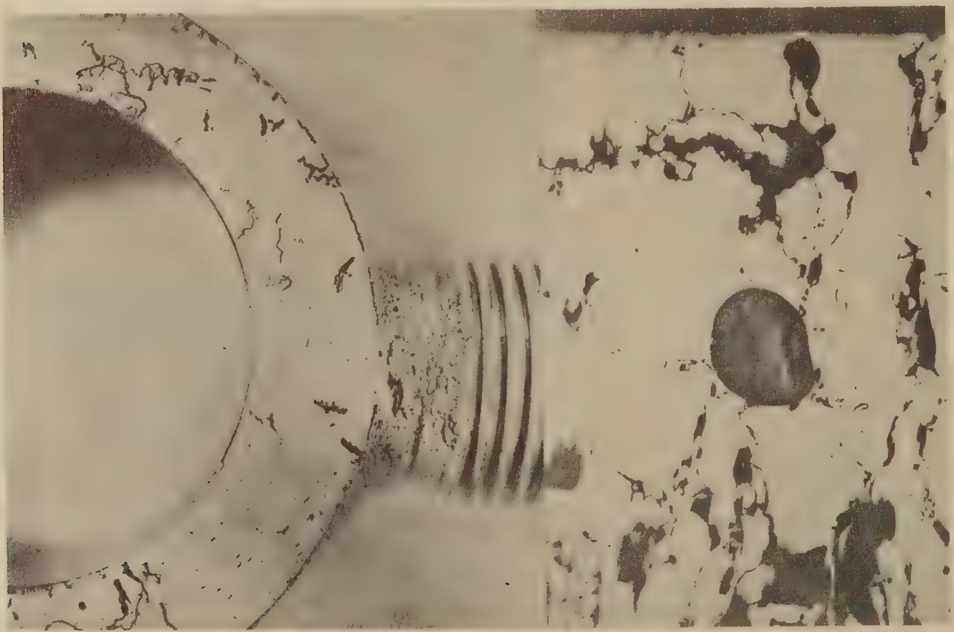


FIG. 8 - Above, (A), is a photograph of magnetic indications on a heat-treated (4130) precision cast terminal. Reject. The terminal is shown at 3X while (B) is an unetched cross-section through the indications at 50X. A large round inclusion can be seen and several large irregular shaped blow holes and numerous fine cracks.

dications that run lengthwise of the bolt or nut or light indications that travel around the end of the bolt or nut would also be cause for rejection. Light short longitudinal indications, that are obviously small inclusions, are not cause for rejection. In November 1944, the A.A.F. issued appendix No. 1 to technical Directive No. A260-2. The appendix covers the magnetic inspection of nuts and bolts and not only goes into great detail on the method of inspection but actually sets standards for rejection. This is the only written standard for acceptance or rejection the writer has seen.

(7) *Precision Castings.* The general thinking on accuracy of size and high strength has been recently published.[1] The article contends that after heat treatment, precision castings are comparable to the average forging. In the aircraft industry, there is a great temptation to use precision alloy steel castings for small parts that would normally be made of forgings, due to the small quantity of parts involved and the high cost of forging dies.

In fig. 8, is shown the result of a magnetic inspection on a lot of precision cast terminals. The material was 4130 steel, heat treated to approximately 150,000 psi tensile strength. The entire lot of 78 pieces showed magnetic indications. The part with the heaviest indications is invariably selected for metallographic examination, and such was the case in fig. 8. The cross-section through the part contains large inclusions, blow holes and numerous cracks, and needless to say, the entire lot of expensive parts was scrapped and no further attempt has since been made to replace high strength alloy steel forgings with heat-treated precision castings. It should not be interfered that the same difficulty would be encountered in precision casting other materials, for that is not true.

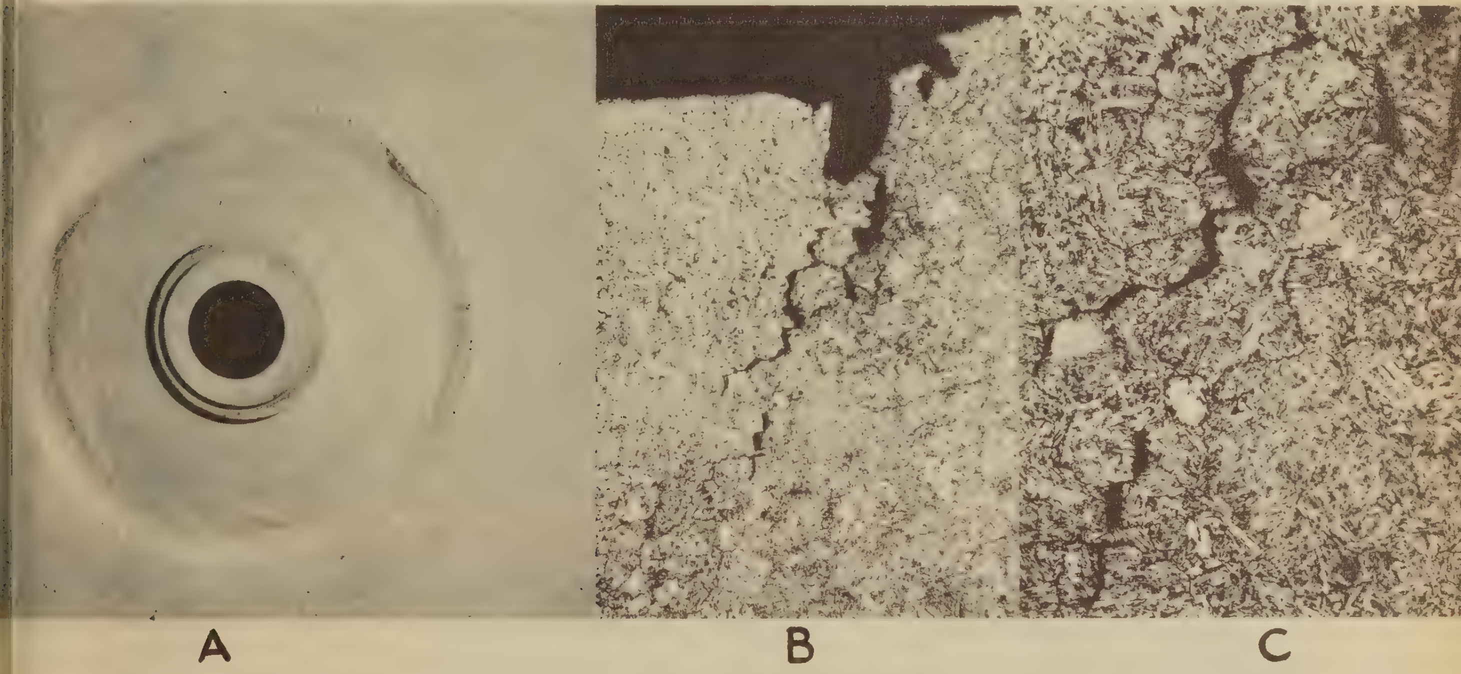


FIG. 9 - Above (A) is an interior view, actual size of an atomic hydrogen weld in a hydraulic accumulator. A series of tiny holes were present around the edge of the weld joining the end fitting to the half shell. Small indications radiated 1/16 to 1/8 in. from some of these holes. (B) is a cross-section through one of the holes with indications, at 40X, and shows one type of defect - a hot crack - found in weld by magnetic inspection. These cracks occur at a very high temperature and are characterized by their failure around the original austenitic grain boundary. (C) is the same view of the hot crack at 100X. It shows large and small cracks and the normalized structure of the 4130 steel used for these parts which had been normalized after welding.

(8) *Welds.* In the magnetic inspection of welds, the usual procedure is to grind out any indications representing cracks or long gas pockets and repair them by rewelding. If the part can not be rewelded, cracks or heavy indications would be cause for rejection. Due to the roughness of the surfaces, welds are difficult to inspect and considerable skill and experience must be developed. Welds should be inspected on both surfaces. In fig. 9 is an exabple of hot crack, which is a type of defect found in welds by magnetic inspection. In welding small plugs into containers, a great deal of heat is concentrated in a small area by the time the circular weld is completed hot cracks are often encountered. with atomic hydrogen welding the defects can be repaired by rewelding since filler rod is not required. With arc welding the defect would have to be ground or chipped out before rewelding.

(9) *Flash Welds* are widely used in the aircraft industry. Although they require a large amount of eelctrical energy to make a weld, they still take much less current than straight resistance butt welds. For this reason, flash welds are much more widely used for large size work. They have the advantage of high speed welding, good quality and uniformity of results in producing a large quantity of welds of similar parts.

In fig. 10 is a photograph of an alloy steel pivot forging flash-welded to an alloy steel tubing. The metal of the two parts to be welded is heated by the electric current arcing or flash-

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[1] *"Survey of Precision Casting," Metallurgia, April 1947. Abstracted in THE IRON AGE, July 17, 1947, p. 46.*

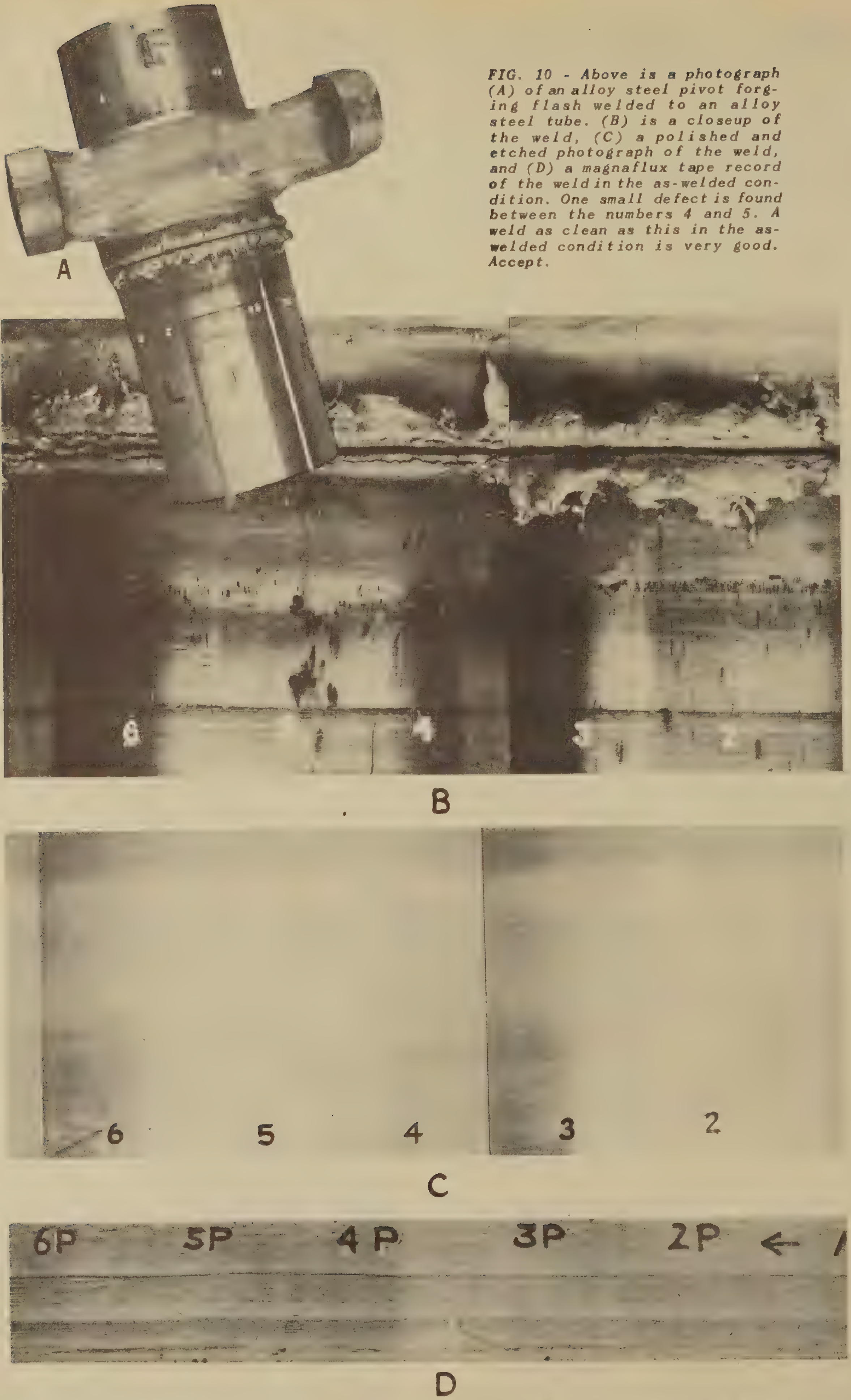


FIG. 10 - Above is a photograph (A) of an alloy steel pivot forging flash welded to an alloy steel tube. (B) is a closeup of the weld, (C) a polished and etched photograph of the weld, and (D) a magnaflux tape record of the weld in the as-welded condition. One small defect is found between the numbers 4 and 5. A weld as clean as this in the as-welded condition is very good. Accept.

ing between the two parts. When the metal is up to welding temperature, the two parts are driven together and much of the hot metal in the joint is driven out of the joint (inside the joint in the case of tubes). One of the disadvantages of flash welding is the possibility of trapping oxidize dmetal from the flashing cycle in the weld. Magnetic inspection of flash welds with the flash left on is not possible.

One of the big advantages of flash welding over other types of welding is the ability to machine off the flash both inside and outside flush with the base metal and have a weld of uniform material (since no filler rod is added) and a weld that does not form a point or line of stress concentration, due to the uniform cross-section through the weld. After machining off the flash, these welds lend themselves very well to magnetic inspection by polar magnetization. The part is magnetized in the coil which produces longitudinal magnetization of the part.

There is quite a bit of disagreement over the merits of magnetic inspection of flash welds. Heads of mechanical inspection departments are apt to condemn the process. They are used to clear-cut results with the use of "go" and "no-go" gages. If a part is oversize, they can measure it and have a definite answer of how much it is overside. But with magnetic inspection the answers seem vague and intangible.

As is the case with the inspection of an arc weld, considerable skill and experience must be developed for satisfactory magnetic inspection of flash welds. In the aircraft industry it is the usual practice to assign material or process engineers to certain types of work such as heat treating, flash welding or plating. The engineer assigned to flash welding soon learns to correlate the results of magnetic inspection of flash welds with the results of physical tests. It is the standard procedure to test to destruction a small percentage of each lot of flash welds. The remainder of the parts must be 100 pct inspected by some nondestructive means, either proof loading or magnetic inspection. With qualified men and a few physical tests made on parts when questionable indications are found, high quality inspection of flash welds can be made with magnetic inspection.

Fig. 10 shows a large alloy steel pivot forging flash welded onto a large alloy steel tube. Below the jagged flash that has been squeezed out of the joint is a sound weld. A composite photograph is also shown of a close-up of the weld, a view of the weld after machining off the flash and grinding, polishing and etching the weld, and a magnetic tape record of the weld in the as-welded condition.

Due to the difference in hardness of the metal in the as-welded condition, two wide bands of magnetic indications are found. In the center is a narrow clear band with one small indication between 5P and 4P, which locates the weld line. This small indication would not be cause for rejection. However several such indications or longer, heavier indications would be cause for rejection. The same defect may be found on the etched section of the tube between 4 and 5 as a small dark area.

The tube was subsequently heat treated and cut into strips and pull tested, which is the standard way of qualifying the settings of the flash welding machine on a new size part. After normalizing and heat treating, the two wide bands disappear from either side of the weld in magnetic inspection since a uniform hardness is obtained throughout the piece. However, if different materials are welded together or materials of different hardenability are welded together, a uniform indication is apt to be found all the way around the part at the weld line due to the difference in hardness. Here, representative parts must be subjected to destructive physical tests and the quality of the weld verified. It is the recognition of these false indications and the ability to pick out true defects that is the skill of a good magnaflux inspector.

New Chemical Minimizes Lime Scale Formation

A NEW chemical that stabilizes water and prevents formation of lime scale in the water system is said to have reduced downtime and maintenance costs on annealing furnace cooling systems at the Sun Steel Corp., Canton, Ohio. The furnaces were formerly shut down for 48 hr every 3 or 4 months to clean out scale deposited by the hard water (40 grains per gal), but use of the chemical, called Micromet, has made possible 10 months operation without descaling.

Micromet is a soluble phosphate glass, developed to protect small water systems against lime scale, corrosion and "red water", and is not a water-softener in the customary sense. It is applied to the water with a tank-type feeder, see fig. 1, Spun Steel Corp. has installed the system on each of its four annealing furnaces that normally use about 250,000 gal of water per month. Inspection of one of the furnaces, the one not descaled before installation of the Micromet setup, showed the old scale formation to have softened. Micromet is produced by Calgon, Inc., Pittsburgh.

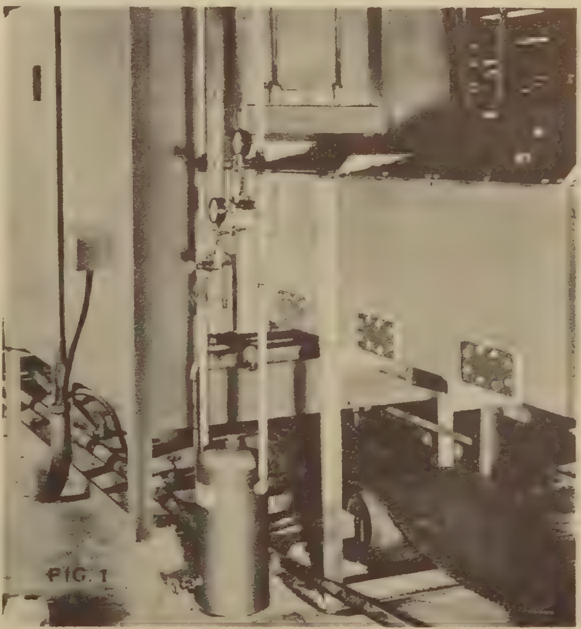
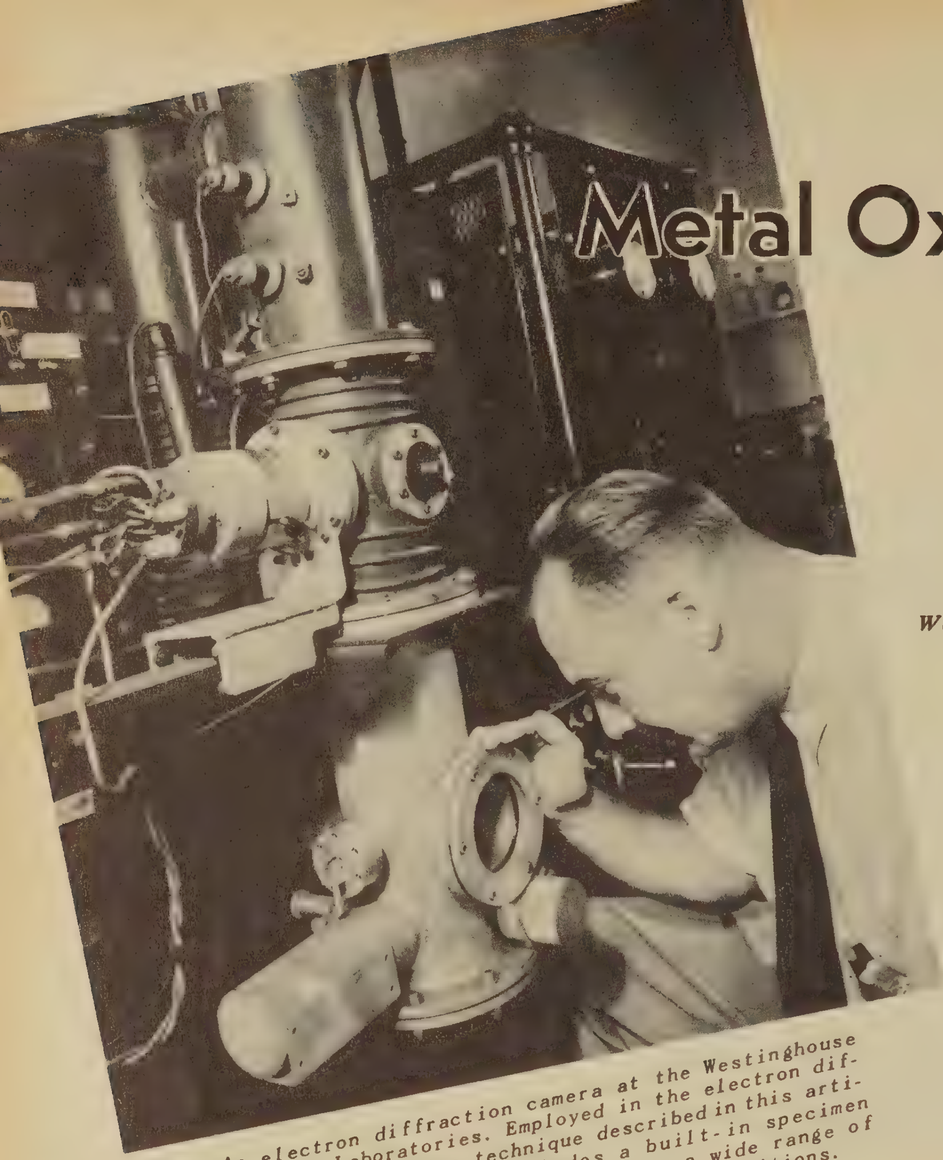


FIG. 1

Metal Oxide Films



An electron diffraction camera at the Westinghouse Research Laboratories. Employed in the electron diffraction reflection technique described in this article, this equipment includes a built-in specimen furnace which permits studies over a wide range of temperatures and atmospheric pressure conditions.

◦ ◦ ◦

By J. W. HICKMAN
Westinghouse Research Laboratories,
E. Pittsburgh

◦ ◦ ◦

ONE of the major problems facing the metallurgist today is the development of alloys which can withstand high temperatures in various gaseous atmospheres over long periods of time. Usually the strength properties of alloys at high temperatures are given first consideration in selecting a desirable alloy composition. However, equal consideration generally must be given to the oxidation and corrosion that takes place in the environment to which the alloy is exposed, in order that strength at high temperatures may be retained. The length of time a material is able to stand the stress at high temperature depends upon surface stability as well as load-carrying ability. Failures may occur at elevated temperatures as the result of general, intragranular and intergranular attack.

In this article the author attempts to outline the general problem of investigating the structures of thin oxide films on metals and alloys to summarize the results of his research and thinking in this field during the last three years.

Dr. Hickman author of this article died July 26, 1948—Ed.

One of the important factors that determine the resistance of a metal or alloy to further chemical reaction may be the structure of the superficial oxide film. The determination of the physical and chemical structure as well as the stability of the oxide film formed on the surface as a function of time and temperature of the chemical reaction may furnish clues as to the nature of the reaction process and the protective quality of the film.

The following factors are considere dimportant in determining the chemical and physical structure of the oxide film on the surface of an alloy:[1]

(1) The rates of formation and diffusion of the various metal ions through the oxide lattice.

(2) The rate of diffusion of oxygen atoms or molecules through the oxide lattice.

(3) The thermodynamic stability of the oxide.

(4) The lattice type of the oxide and its resemblance to the metal or alloy lattice.

(5) The chemical reactions which may occur in the oxide film between the several oxides or between metal ions or oxygen atoms and the several oxides.

(6) The pre-oxidation treatment of the metal, such as annealing, polishing, cleaning, etc.

(7) The rates of nucleation and growth of the oxide crystals.

at Elevated Temperatures

Although strength properties are usually given first consideration in the selection of metals for high temperature service, equal consideration must be given to oxidation and corrosion resistance properties. Investigation of the structures of thin oxide films in various metals and alloys, conducted for the purpose of evaluating surface stability characteristics, is rereported herein. In this first part of a two-part article, the author discusses the principles associated with the study of surface structures and outlines the experimental procedure followed in the course of this reflection electron diffraction study.

In general, (1), (2) and (7) are unknown both from theory and experiment. It is possible that some information concerning (1) may be obtained from electron diffraction studies while electron microscope investigations at elevated temperatures may yield information concerning (7). (3) and (5) have been estimated from thermodynamic data while (4) has been determined from diffraction studies and the effect of (6) is generally unknown although some work has been done along these lines.[2]

In order to form ions in the oxide lattice, energy barriers, which are probably dependent upon the ionic charge, must be overcome. The metal or alloy, therefore, may form divalent ions in the oxide lattice more readily than trivalent ions. The concentrations of the possible ionic species not only depend upon the rates of formation but also upon their diffusion through the lattice. The ease with which an ion diffuses through the diffuse for a given concentration gradient may depend largely upon the ionic size.

The relationship of the lattice type of the oxide to that of the underlying metal or alloy may determine which oxide will form.

It is possible that a given oxide may have greater probability of forming if its lattice matches that of the metallic substrate. Goldschmidt[3] has shown that both FeO and Fe_3O_4 have lattices which may readily be derived from the lattice of alpha iron, while alpha Fe_2O_3 has arhombohedral lattice which differs considerably from that of body-centered cubic alpha iron. Under these circumstances, both Fe_3O_4 and FeO might be expected to occur in contact with metallic iron while alpha Fe_2O_3, if it does form, would be present on the outer surface of the oxide layer. Experimentally, Fe_3O_4 and FeO are found in contact with alpha iron while alpha Fe_2O_3 is not.

From the thermodynamic stabilities of the several oxides that may occur, it is possible to predict the equilibrium state which the system will approach. However, in some cases energy barriers may prevent this equilibrium state from being observed. Among these: (1) the rate of formation of the required metallic ions may be too low for the solid phase reaction to occur, and (2) the rate of diffusion of the necessary ions from the metallic substrate into the oxide lattice may be too low.

It is readily apparent that if chemical reactions occur in the oxide film, the equilibrium states of these reactions will determine the oxides that will be observed. Examples of such reactions are:

$$2Cr(s) + Fe_2O_3(c) \rightleftharpoons Cr_2O_3(s) + 2Fe\ (s) \qquad (1)$$

$$Nio(s) + Cr_2O_3(s) \rightleftharpoons NiO.Cr_2O_3(s) \qquad (2)$$

$$2Fe_3O_4(s) + 0.5\ O_2(g) \rightleftharpoons 3Fe_2O_3(s) \qquad (3)$$

$$Fe(s) + Fe_3O_4(s) + 4FeO\ (s) \qquad (4)$$

Some of these reactions have been studied by electron diffraction.[4, 5]

Pre-oxidation treatment, particularly the effects of abrasion, has been studied on iron[4, 6] and on stainless steel.[2] The chromium-iron ratio in the oxide film on stainless steel increases with increased degree of polishing showing the abrasion tends to concentrate chromium preferentially in the surface layer.

Structural Methods

The study of surface structures may be conveniently divided into three parts. One part of this study is concerned with the atomic geometry and the composition of the outer layer which is i ncontact with the gaseous atmosphere. This may be accomplished with reflection electron diffraction where the electron beam probably samples no more than the outer 100A of the film. A second part concerns itself with the structure and composition of the body of the oxide film after it is removed from the substrate by chemical or electrochemical means. This may be studied by the transmission electron diffraction technique if the film is not too thick (probably less than 150A) for the penetration by the electron beam.

When the film cannot be penetrated by the electron beam, it is possible that the Geiger Counter X-ray Spectrometer or conventional X-ray film techniques may be used. The third part deals with the secondary structure of the oxide film. Here we are concerned with the mechanisms of growth of the oxide crystallitesfi their shapes, sizes and the sharpness of their boundaries. In some cases these characteristics may be studied by using light microscopy but a much more powerful tool, particularly for thin films, is the electron microscope.

A combination of all these methods of investigation will give a fairly complete picture of the oxide film from the structural point of view. It is possible, however, that ambiguities as to the chemical composition of the film may remain unsolved. These ambiguities arise because of the limitations of the above instruments. The unequivocal chemical identification of some thin oxide films, for example on alloys of iron and chromium, presents problems as yet unsolved because the structural tools have difficulty differentiating between; (1) Fe_3O_4, alpha Fe_2I_3 ad solid solutions of these, and (2) Cr_2O_3, alpha Fe_2O_3 and solid solutions of these.

This is true because the differences in the diffraction patterns, such as line distribution and intensity, are so small that absolute chemical identification may not be possible. In these cases it is necessary to remove the film from the substrate by some means and resort to chemical or spectrographic analysis. Unfortunately there is no certainty that the process of removal does not affect the film chemically. In most cases the small quantity of material available for analysis makes the chemical method extremely difficult.

In recent years the development of high temperature electron diffraction cameras by Jackson and Quarrel[6] and by Gulbransen[7, 8] has made possible the study of the structures of thin oxide films at the temperatures of their formation. The camera at the Westinghouse Research Laboratories consists of the following components: (1) a hot filament electron source, (2) a 0.004-in. anode aperture, (3) an axial symmetric magnetic field, (4) a sample manipulator with furnace, and (5) a fluorescent screen and photographic plate chamber. Using 47.5 kv and a current of 50 m amp, exposures of 2 to 10 sec are necessary.

The furnace, which is mounted on the end of the specimen manipulator, can be heated to 1000°C (1832°F) by an internal tungsten pin heater operating in an hydrogen atmosphere. The heater temperature is controlled by a thermocouple type of regulator. Specimens are mounted on the front surface of the furnace block.

Gas purification trains are included in the auxiliary apparatus in order that pure oxygen,

TABLE I

Analyses of the Alloys Investigated

Alloy	Fe	Cr	Ni	Al	Si	Mn	Cu	Mo	W	Cb	C	P	S	Co	Ti	Zr	Ca
Alchrome 6	Bal.	20	....	6	....	....	....	....	....	....	....	....	....	....	....	....	....
Worthite	Bal.	20	24	....	3.25	0.60	1.75	3.0	....	....	0.07	....	....	....	....	....	....
S.S. 301	Bal.	18.01	8.81	....	0.39	0.48	....	....	....	....	0.10	0.02	0.02	....	....	....	....
S.S. 446	Bal.	26.07	0.09	....	0.40	0.54	....	....	....	....	0.17	0.02	0.02	....	....	....	....
S-588	Bal.	17.40	19.85	0.02	0.59	0.78	....	4.20	3.89	4.19	0.47	....	....	....	....	....	....
Nichrome V (12046)	0.34	19.91	Bal.	0.07	1.39	0.01	....	....	....	....	0.08	....	....	....	....	0.10	0.024
Nichrome (13346)	Bal.	16.57	61.47	0.07	1.24	0.10	....	....	....	....	0.06	....	....	....	....	0.06	0.029
Inconel	6.5	13	79.5	....	0.25	0.25	0.20	....	....	....	0.08	....	....	....	....	....	....
Stellite-21	1.5	27.5	....	....	0.93	0.83	....	5.0	....	....	0.25	....	....	Bal	....	....	....
Refractaloy	15	20	20	....	0.3	2	....	8	4	....	0.1	....	....	30	....	....	....
K-42-B	12.0	20.0	41.7	0.21	1.21	0.57	....	....	....	....	....	....	....	22.5	1.89	....	....
Hipernik	49	....	49	....	....	2	....	....	....	....	....	....	....	....	....	....	....
Kovar	54	....	28	....	....	....	....	....	....	....	....	....	....	18	....	....	....
Mild Steel	Bal.	....	....	....	0.05	0.32	....	....	....	....	0.18	0.02	0.03	....	....	....	....
Z-Nickel	....	....	Bal.	2	....	....	....	....	....	....	....	....	....	....	....	....	....
Hastelloy A	15-20	....	50-60	....	....	2	....	15-20	....	....	0.13-0.20	....	....	....	....	....	....
Hastelloy B	5	....	60-65	....	....	....	....	25-35	....	....	....	....	....	....	....	....	....
Hastelloy C	6	12-16	55-60	....	....	....	....	15-20	5	....	....	....	....	....	....	....	....
Hastelloy D	....	....	85	2	10	....	3	....	....	....	....	....	....	....	....	....	....
Alloy D (Jelliff)	Bal.	15-20	30-35	....	1.5	....	....	....	....	....	....	....	....	....	....	....	....

hydrogen, air and other gases may be added to the camera when it is isolated for this purpose from the pumping system. Gas-metal reactions at elevated temperatures are carried out by admitting various gases at known pressures and allowing the reactions to proceed for definite periods of time.

Since the apparatus permits samples to be heated to 1000°C, it is possible to investigate the structures of thin oxide films on metals and alloys at temperatures higher than those to which many of the metals and alloys are normally exposed. It is important that the oxide structures be investigated at the temperatures of their formation, since chemical and physical changes may occur when the samples are cooled to room temperature.

With this instrument it is also possible to investigate the stability of the oxide structure which forms. The effects of heating and cooling oxide films of different thicknesses may be studied in vacua and various controlled atmospheres. The structural and chemical changes that occur as the oxide film builds up on the surface of the metallic substrate, may be investigated over a wide temperature range. In some cases it is possible to make qualitative comparisons of the sums of the rates of formation and diffusion of metallic ions. The author has attempted to do this for titanium, copper and nickel.[21]

When the reflection electron diffraction technique is used to study oxide surfaces, the preparation of the metallic surface prior to oxidation is important in determining the quality of the patterns obtained. Experiments have shown that a clean, flat, slightly matted surface, which can be penetrated by the electrons, gives sharp, intense patterns.

Samples are prepared by machining or grinding to dimensions of 0.375 in. length and 0.375 in. diam. These are given a surface finish with a precision abrader[7] ending with 4/0 emery paper. Oxidations are carried out in the diffraction camera without any other pretreatment (such as annealing or etching). Purified oxygen under approximately 1 mm pressure is used as the oxidizing agent. Diffraction patterns are taken at high temperatures in the vacuum of the camera before oxidation; after 1, 5, 30 and 60 min oxidation; and after cooling to room temperature under approximately $.05 atmosphere pressure of dry hydrogen. Hydrogen is used to enhance the cooling rate and to determine if the oxide is easily reduced.

Pure, dry oxygen is used as an oxidizing agent in order that the interpretation of the experimental results may be simplified. To prevent the formation of an oxide film sufficiently thick to cause flaking, a pressure of 1 mm is used. A maximum oxidation time of 60 min is used so that each investigation at a given temperature may not be too timeconsuming.

In addition to the structural studies by the author, other phases of the general investigation of gas-metal reactions have included rate studies by Gulbransen, et al, on iron[9], chrome-iron and stainless steel[10], aluminum[13], magnesium[14], molybdenum[15] and tungsten[16]; studies of rate mechanisms by Gulbransen[11, 12]; electron microscope and diffraction studies on stripped oxide films of metals[17] and alloys[18] by Phelps, Gulbransen and Hickman.

TABLE II

Lattice Parameters of Spinel Type Oxides

Oxide	a(A)
$CoO.Co_2O_3$	8.11
$FeO.Al_2O_3$	8.12
$NiO.Cr_2O_3$	8.31
$CoO.Cr_2O_3$	8.32
$NiO.Fe_2O_3$	8.34
$FeO.Cr_2O_3$	8.35
$CoO.Fe_2O_3$	8.39
$FeO.Fe_2O_3$	8.40
$MnO.Cr_2O_3$	8.42
$MnO.Fe_2O_3$	8.51

It is the purpose of this article to present a review of some of the reflection electron diffraction studies that have been undertaken in the author's laboratory during the past 3 years. Because of the voluminous data that have been collected, this article will be limited to comparisons of the oxides which occur on the surfaces of commercial alloys at the several temperatures after oxidation has proceeded for 60 min. The results on metals and binary alloys are only briefly discussed.

Commercial Alloys

The first step in the investigation of the oxides that form on commercial alloys was the collection of as much data as possible on the oxides that form on the purest metals available. Up to the present time studies have been completed on iron[4], cobalt[4], nicqel[4], chromium[4], copper[4], tungsten[5], molybdenum[5], beryllium[20], uranium[20], thorium[20], titanium[21] and zirconium[21], while investigations are in progress on tantalum and columbium.

These studies have shown that the oxide structures of thin films are identical with those of bulk oxides as determined by X-ray diffraction. Some of the metals, for example, nickel, chromiuc, copper, beryllium, uranium, thorium, titanium and zirconium form only one oxide with the experimental conditions used. Others, however, such as iron, cobalt, molybdenum and tungsten form oxides which are dependent upon the temperature and time of oxidation. In these cases the oxid ewhich forms at low temperature transits to another oxide as the temperature is elevated. With the exception of the oxide transition occurring on iron the others appear to be irreversible under the experimental conditions used.

The results obtained with the metals led to the next step of the investigations which involved the study of the oxides that form on binary alloys. These alloys were selected for study since the analyses of the diffraction patterns may be easier than for most of the commercial alloys. The binary alloys present added difficulties in comparison with the metals since the oxides which form may be complex and contain both of the metals, or solid solutions of various oxides of the two metals may occur. In many cases the electron diffraction studies cannot give the chemical composition unequivocally. This must be inferred by a comparison of the data with X-ray diffraction investigations of specimens of known composition.

The investigations of the binary alloys have shown that it is not possible to predict the oxide that will form on the surface on the basis of the thermodynamic stabilities of the several possible oxides or of the sizes of the several metallic ions that may form. In addition oxides of some of the elements, for example, silicon and zirconium, are not observed in the outer surface of the oxide layer. This may indicate that ions of these elements have much lower rates of formation and diffusion than those of the other constituent in the alloy. In other cases, oxides of one metal occur at low temperatures while oxides of the other metal appear as the temperature is elevated. This indicates that the rates of formation and diffusion of the ions of the two metals vary in different manner with temperature.

In some cases complex oxides form on the surface; this is particularly true of binary alloys that contain iron, chromium or nickel. Experiments involving heating and cooling of oxide films on the surfaces of some of these alloys have shown that solid phase reactions between metal and oxide, or between two oxides, may occur in the heating cycle while no transitions occur upon subsequent cooling. A rather comprehensive investigation of copper-nickel alloys[19] has shown that the occurrence of nickel oxide on the surface is more dependent upon the temperature of oxidation than upon alloy composition. Further work on the binary alloys is in progress, some of which will shortly appear,[20] to determine whether a table of comparisons of the sums of the relative rates of formation and diffusion of the metallic ions may be formulated.

Various commercial alloys of widely different compositions have been selected for study. Most of these are important in the metallurgical industry today. Some of these, for example, S-588, Inconel, Stellite-21, Refractaloy, K-42-B, and Hastelloys B and C, are used in high temperature service such as gas and steam turbines and jet propulsion. Others, such as Nichrome V, Nichrome and alloy D (Jelliff) are alloys of the heater type. Magnetic alloys are Hipernik and mild steel while Kovar is used primarily in glass-metal seals. The Hastelloys and Z-Nickel are particularly noted for their resistance to corrosive action in chemical industry installations.

Table I gives the available analyses of these alloys. In some cases the analyses are only approximate.

In addition to the simple oxides of the metals in the alloys, various complex oxides may form. Among these are quite a few oxides with cubic structures of the spinel type. The notation "spinel" refers to a cubic structure similar to that of $MgAl_2O_4$. Table II lists some of these cubic (spinel) oxides together with their lattice parameters.

It is evident, from an inspection of the table, that the problem of identifying an oxide on the surface of an alloy may be extremely difficult if two or more of the oxides in table II are present simultaneously. In many cases it is not possible to give the exact chemical composition of the spinel oxide which forms. The principal reason for this uncertainty is the similarity in structures and unit cell sizes which results in the same distribution of diffraction lines and intensities of these lines. This similarity of structure increases the probability of solid solution of one oxide in another.

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In a subsequent issue, the author will discuss the results obtained from this study and will indicate the relationship between his data and that of other investigators.—Ed.

"Eye-Dropping" Technique for Testing Steel

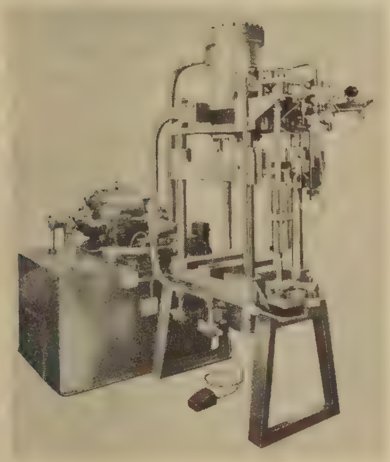
THE "eye-dropper," as now used industrially in the Schenectady Works Laboratory, General Electric Co., is a heat-resistant glass tube, about the diameter of a lead pencil and 18 in. long, with a rubber bulb at one end. Molten steel from a furnace is drawn up into the tube by squeezing the rubber bulb. The steel hardens into a smooth, homogeneous rod within 5 min, the glass is cracked from it, and the rod is ready to be checked for quality. Eye-dropper samples may be prepared for analysis in a few minutes

New Production Ideas . . .

New and improved machines for tube-bending, metal shearing, valve and tool grinding, gear checking, spring testing, filtering waste pickle liquor, and centrifugally coating enamel are featured this week. Generators, hydraulic pumps, sand rammers, a wax type corrosion inhibitor, and various machine shop units are also included.

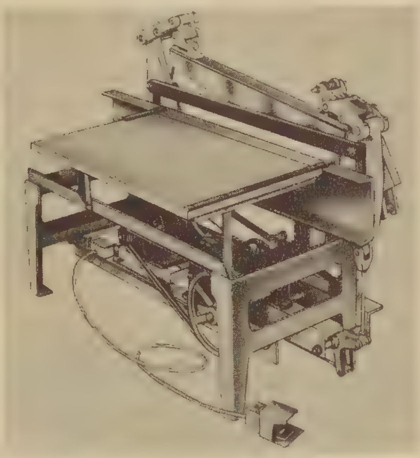
Tube-Bending Press

ANY number of sequences up to 12, with adjustable bending depth and automatic reset feature a new hydraulic type-bending press announced by *Elmes Engineering Works*, 1002 Fulton St., Chicago 7. This feature, together with a choice of four bending radii, provides a selection of any or all of 48 possible bending variations for forming exhaust pipes, frames, furniture tubing, and similar products on a mass production basis. Press capacity is 20 tons. The press bed has two cushions, with two bending noses of different radii in line with each cushion. An indexing device controls the sequence and depth of bends, after which the index automatically resets to starting position. Foot treadle control operates the press cycle. Uniformity of work is claimed at any production speed, because all bends are controlled mechanically.



Electric Shear

REDESIGN of the heavy duty shear manufactured by *Alfa Machine Co.*, 2426 W. Purdue St., Milwaukee 9, makes the machine more versatile and facilitates production through use of interchangeable parts. Tripped electrically, the standard switch can be placed anywhere around the machine for convenience. The power operated clamp replaces foot power and is adjustable for opening for thicker and thinner materials as well as the amount of clamping pressure desired. The shear now has a clutch which engages instantly for the cut to be produced. The complete cutting cycle, including clamping, cutting and unclamping can be done in ¾ sec from the time the foot switch is depressed. This foot switch can be replaced by a limit switch or photo-electric cell which will trip the shear automatically or in semi-automatic operation.

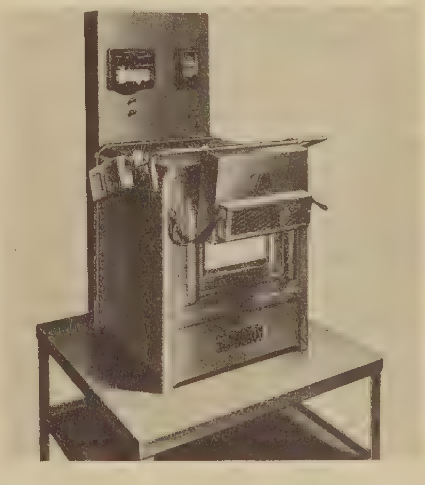


Valve and Tool Grinder

FLAT head and 15° valves can be handled easily and speedily without special attachments or adjustments on the No. 6 universal valve and tool grinder added to the valve reconditioning line of *Black & Decker Mfg. Co.*, Towson 4, Md. Valve stem capacity ranges from ¼ to 1¼ in. and valve head capacity is up to 5¼ in. Large Diesel valves are adapted to the No. 6 grinder because of this large capacity. Rocker arms, valve stems and tappets are quickly ground with the aid of attachments which are standard equipment that includes five twin-grip collets; collet push rod and nose piece for small valves; rocker arm grinding attachment, diamond wheel dresser; cutter-type wheel dresser; micrometer valve stem grinding attachment; and a universal depth gage. Close tolerances can be maintained when grinding valves, giving a smooth finish. Cylindrical grinding and sharpening of cutters and reamers can be handled with ease, it is claimed.

Heat Treating Furnace

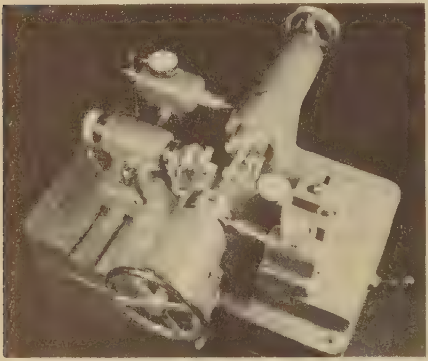
CONTROLLED temperatures in the range from 300° to 2000°F are available in the Model VK-6 electric box furnace announced by *Cooley Electric Mfg. Corp.*, 38 South Shelby St., Indianapolis. Having an 8x6x14-in. chamber, this model is useful for tool



and die work, production heat treating of small parts, running pilot lots, emergency repairs, industrial and laboratory testing, and other work requiring controlled heating. A simplified vertical lift door having exterior mechanism and counterweights conserves heat when charging small parts since only a limited portion of the chamber need be exposed. Power capacity of the furnace is 4650 w. Rapid and uniform heating is assured by six embedded-type heating elements, including one in the door. The furnace heats from cold to 2000°F in 1½ hr, or in half this time after overnight shut-down. Continuous operation at 2000°F is possible. A selective power modifier provides temperature control down to 300°F.

Gear Checker

LEAD, eccentricity, and tooth spacing and parallelism can be checked on gears up to 10 in. OD with the universal gear checker announced by *National Broach & Machine Co.*, 5600 St. Jean Ave., Detroit 13. It is smaller and more compact than its predecessors, requires less floor space and is easier to move from one location to another. Its accuracy makes it ideal for tool room work and on final inspection, it is reported. Its simplicity makes it desirable for service in the shop alongside gear cutting and finishing machines. Overall dimensions are 18x29 in.



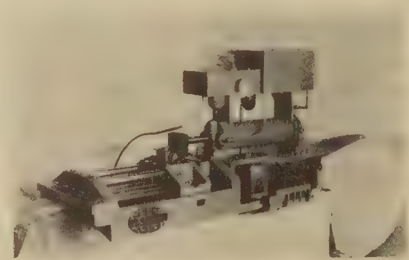
Spring Load-Tester

FIFTY to 200 springs can be tested with an accuracy of one part in 2500 at maximum load, in from 15 min to 1 hr, using the improved load-tester announced by *Hunter Pressed Steel Co.*, Lansdale, Pa. The tester will handle loads up to 5 lb, and spring lengths up to 12 in. It is equally adapted to the go-no-go or the frequency distribution techniques of statistical inspection. Ruggedness without loss in precision is attained by small precision ball bearings acting as fulcrums for the weighing beam.

The weighing head, which remains horizontal at all times, and the weight pan are attached to the weighing beam. Design features include replaceable compression-head surfaces and a tension hook, ball mounted to swivel freely. An overload spring prevents damage from excess load or shock. The pointer mechanism amplifies beam motion 10 times for easy reading on a stainless steel scale graduated in 40 divisions. Length measurements are recorded on a dial that has a 1 in. range with 0.001 graduations. Compression and extension loading heads are adjustable for vertical positioning. The machine weighs 41¾ lb.

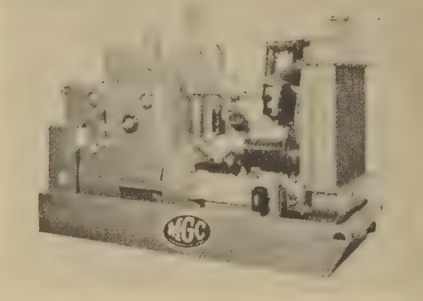
Air-Operated Slide Feed

AN air-operated slide feed that takes no connections from the punch press is a self-contained unit developed by *U. S. Tool Co., Inc.*, Ampere, N. J. The basic principle of the slide feed design—a block positively actuated between definite stops—assures accuracy even on non-uniform stock. The positive stops prevent any overthrow and limit the motion of the stock to the desired length. The air feed can be used semi-automatically or can be made fully automatic by incorporating suitable interlocking switches. It is reported that practically unlimited feed lengths can be obtained by making a multiple of strokes with feed timed to coincide with a stroke of the fabricating unit. Accuracies can be controlled to 0.002 in. at each stroke of the feed.



Generators

A COMPLETE line of gasoline engine driven generators to supply power for handling scrap or pig iron with magnet cranes has been announced by *Motor Generator Corp.*, Troy, Ohio. These magnet generators are available in six sizes, ranging from 5 to 25 kw. They are compact, lightweight, and are without canopies for easy installation in the crane operator's cab. A commercial automotive type gasoline engine is standard, but they can be furnished with Diesel engines. They are connected directly to and on a common structural steel base, and are drip proof, ball bearing mounted, self-ventilated and rated for continuous duty. All models have 6 v battery ignition, push button starter, radiator, fuel tank, and are fully assembled.

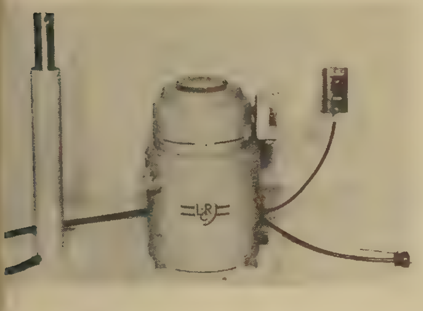


Motor Capacitor

A NEW Pyranol motor capacitor that withstands the same physical treatment as the motor itself, has been designed by *General Electric Co.*, Schenectady 5. Available in all popular ratings, the capacitor is completely enclosed in 10-gage steel tubing. Bushings are of silicone, the rubber-like material that seals permanently by compression without gaskets or stickers, and that is impervious to oils, acids, and alkalies. The steel mounting bracket is spot-welded to the capacitor enclosure. Long Flamenol leads are protected by insulating eyelets where they pass through the enclosure, and are unaffected by baking heat, oil, water, or mild acids.

Hydraulic Pump

A PACKAGE type hydraulic power unit that will deliver 1½ gal of oil per min and develop a pressure of 1000 psi has been designed by *Lyon-Raymond Corp.*, 852 Madison St., Greene, N. Y. A lange mounted motor is placed diectly on top of the oil reservoir vhich has a 2½-gal capacity. The ntire assembly measures 18¼ in. igh x 12½ in. diam. The unit is inished with all controls, which re electric so that the pump can e operated from remote positions. The ¾ hp motor used is available or 110, 220, and 400 v service. A -way valve operates a single acion hydraulic cylinder.



Plug Gages

COLLET-HELD plug gages of tough, lightweight plastic are eing manufactured by *Turner Bros., Inc.*, 2625 Hilton Rd., Fernlale 20, Mich. The go and no go gage members are held in opposite ends of the gage handle by selflocking plastic collets. The selfocking device grips the gage and prevents it from sticking in the hole being gaged. Known under the trade name Plast-O-Lock, the gages are available in a range of diameters from 0.050 to 0.690 in.

Enameler

A COMBINATION dipping-whirling machine for coating small parts with enamel, lacquer, paint, or other liquid finishing material has been developed by *Ronci Machine Co.*, 2 Atlantic Blvd., Centredale 11, R. I. Two models of this centrifugal coating equipment are available: R-100 and R-200 having work baskets of cast aluminum lined with steel mesh wire and measuring 11½ in. diam x 4 in. deep and 16 x 6 in., providing capacities of 312 and 1206 cu in., respectively. Starting and stopping is controlled by a single lever on the first model; raising and lowering the work basket is hydraulically controlled on R-200. A sliding door closes automatically. GE explosive proof motors of 1/3 and 1-1/3 hp, are used for the spinning operation. All operations within the machine are claimed to take 30 sec.

Air Conversion Unit

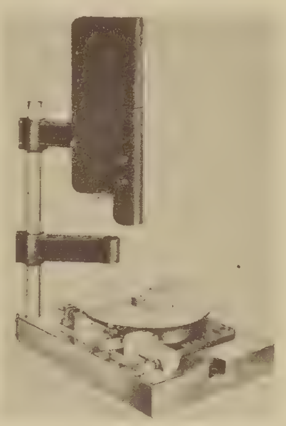
AN air conversion unit that converts any popular size hand-operated arbor press into an air press has been designed by *Paragon Metal Products*, 844 W. Adams St., Chicago 7. To convert the old press, the ram retainer plate and ram are removed, the air unit placed into the ram seat, the plate replaced, and the unit is connected to the shop air line. The air conversion unit has a 4-in. ID cylinder, 2½-in. stroke, ¾-in. ram, and a power factor 12½ times that of the line pressure.

Continuous Filter

WASTE pickle liquor disposal is now facilitated through the use of a small, continuous vacuum filter developed by *Filtration Engineers, Inc.*, 858 Summer Ave., Newark 4, N. J. Used in conjunction with any waste-acid neutralizing process which results in a suspension of iron oxides and other solids in a neutralized solution, the continuous filter separates this suspension into solid cake, and clear filtrate which can be released into streams without danger of acid pollution. Filtering rate ranges from 60 to 600 lb of dry solids per hr, depending on nature of waste liquor and type of neutralizer used. The cake, containing 55 to 75 pct moisture, can be handled by conveyer or truck.

Impact Hammer

A HEAVY-DUTY 12x17x2-in. cast iron base weighing 70 lb with a precision ground surface to support fixtures is said to offer a combination capable of cycles up to 5000 per hr when used with Mead work feeders in combination with impact hammers. The unit is announced by *Mead Specialties Co.*, 4114 N. Knox Ave., Chicago 41, and may be mounted on an ordinary shop bench. It is said to have ample anvil effect to take the blow of the impact hammer. The hammer is actuated by the auxiliary valve on the left side of the rotary work feeder, the valve opening at the moment the dial locks in position to assure synchronization. It closes as soon as the indexing pawl starts back for a new station to allow the hammer time to reset for the next blow.



Sand Rammers

FOR all types of sand ramming in gray iron, steel, malleable, aluminum, and magnesium foundries, a complete new line of sand rammers has been announced by *Rotor Tool Co.*, 17325 Euclid Ave., Cleveland. It is reported the new rammers will cut ramming costs and produce more uniform molds. The tools are lightweight with fast, ramming action. Features include hollow piston rods that are hard chrome plated, a simple washer type valve, and outside adjustment on packing gland and packing that requires no wrenches. An air screen plus automatic lubrication built into the head protect the working parts. Weights range from 7¼ to 18 lb. A wide range of rubber, aluminum and rubber, and malleable butts is provided, together with suitable peens.

Liquid Plastic Coating

A LIQUID plastic plating rack coating called Enthonite 101, developed by *Enthone, Inc.*, 442 Elm St., New Haven, Conn., is supplied as a viscous liquid containing 100 pct solids, which is applied by dipping to produce coatings varying in thickness from ⅛ to ¼ in. The material is applied over a primer coat and is baked at temperatures of 350°F or higher for a short period of time. The coatings are stated to have high resistance to all types of inorganic solutions, particularly plating solutions including chromium plating solutions. The coatings are tough and resilient and will not chip.

Wax Corrosion Inhibitor

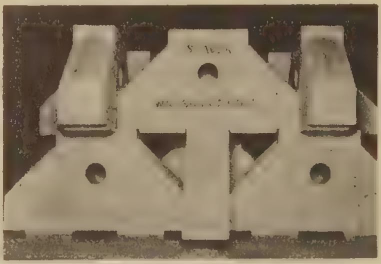
A WATER-EMULSION wax for use as a rust-inhibiting coating for metals has been developed by *S. C. Johnson & Son, Inc.*, Racine, Wis. Applied by dipping, spraying, wiping or flow-coating, this emulsion forms a dry wax coating on the metal part, checking corrosion. It is non-inflammable and non-toxic and gives coverage of 2500 to 3000 sq ft per gal. It is removed by degreasing. The wax can be used on painted and plated parts as a safeguard against scarring and chipping.

Sheet Metal Brakes

PORTABLE sheet metal brakes, featuring detachable open end bars and adjustable finger assemblies, are being manufactured by *Webb Machine & Tool Co.*, Coraopolis, Pa. The new machines, with improved hinges and redesigned folding arms, bend sheets of steel, aluminum, copper, or lead, up to 18 gage. Standard bars have working widths of 31 or 49 in. The clamping bar operates with a flip of the finger and adjusts automatically for all gages.

Cross-Vent Checker Bricks

AN improved basket weave checker system with the new cross-vent checker brick, designed by *Jay J. Seaver Engineers*, 53 W. Jackson Blvd., Chicago 4, increases the heating surface in hot blast stoves, and has been found equally applicable to installation in open-hearths, soaking pite, glass furnaces, water gas sets and similar applications where increased surfaces are desirable to provide greater heating areas and increased productive capacity. The checker brick is a rectangular brick with the upper corners bevelled off and a hole through the middle which gives additional heating surface and equalized heating and pressure over the entire area and lancing openings, if required. Made in stable shapes with the center of gravity below the middle, it is laid up in standard basket weave pattern. Due to a simple cut-away section, each brick is securely locked top and bottom with other brick. It can not twist or turn and may be used with or without tubular inserts.



Carboy Truck

TO speed handling of dangerous chemicals or any liquid generally encased in a carboy, a carboy truck has been developed by *Palmer-Shile Co.*, 16005 Fullerton Ave., Detroit 27. The truck is rolled against the carboy, a handy gripping yoke dropped over the top, then a pulling back on the truck handles and loading becomes automatic. Hardened steel studs on the truck frame holds the load in place. Overall width is 20 in.; length, 48 in.; capacity 500 lb. Rubber, pneumatic or metal wheels are available.

Drum Pump

HAVING a 15 gpm capacity, a self-priming drum pump for alcohols, paint thinners, light oils and other volatile liquids is equipped with a positive shut-off valve that is protection against evaporation losses. This pump, announced by *General Scientific Equipment Co.*, 2700 Huntingdon St., Philadelphia 32, has no pistons, rings or leathers; no rotating parts to stick or wear. The special diaphragm is a heavy cord-fabric vulcanized between synthetics. It does not dr out, rust, and is unaffected by petroleum products, alcohol and mos other fluids. A handy fill-spout facilitates filling measuring cans an containers. All waste is prevente by an automatic drain back.

Two Tone Plating

A METHOD of gold and chrom plating on a single piece o die cast metal has been develope by *Continental Die Casting Corp* 9648 Grinnell Ave., Detroit. In thi process of two tone plating th casting is first given a copper bat for hardening, then a nickel bat for corrosion resistance. The masking material, a copper-nickel meta covered by a plastic coating, i then bridged across the area to b gold plated. With this masking material held securely in place b wire, the casting is chrome plated The mask is removed, and the casting goes to a gold plating bath The gold plated area is the sprayed with a coating of enamel and baked for an hour to provide protective coating for the gold.

Wiring Test Set

A COMPLETE test of the wiring in any building can b made by one person, with the wiring inspector's test set develope by the *Eastern Specialty Co.*, Philadelphia 40. The device is house in a gray fiber carrying case measuring 14 9/16 x 7 5/16 x 9⅛ in Total weight is 13 lb. A compartment provides storage space fo the flexible leads and the portabl meter. Power is supplied from standard 6 v dry cell.

General Purpose File

FOR use on aluminum, bronz cast iron, malleable iron, mil steel and annealed tool steel, a machinist's general purpose file ha been marketed by *Nicholson Fil Co.*, Providence 1. The file ha single cut teeth divided by angula serrations into shorter cuttin edges which remove stock rapidl and leave a smooth finish. In addition to general machine shop filing the G.P. is said to stand up wel under the severe usage of foundr work. Files are available in length of 8, 10, 12 and 14 in. and in on degree of coarseness only. The taper in width but not in thickness

A CASE IN WHICH AN "EXPENSIVE" METAL PROVES MORE ECONOMICAL AS WELL AS BETTER

A four-eyelet moccasin blucher, built on the comfortable Drury Lane last by Old Colony Shoe Company, Brockton, Mass. This golf shoe is leather lined throughout, and features the Sportaid Spike Stabilizers, an inner plate of Revere nickel silver to which the spikes are locked, so they cannot tip or press into the foot. The plate also prevents soles from curling, sagging or lumping.* **® Old Colony Shoe Co.*

It is the most natural thing in the world for engineers and purchasing agents to check prices of materials, and when they find that one costs more per pound than another, to conclude, in the absence of other information, that one is more expensive than the other. However, it is often the case that much more than price is needed to determine which is actually the most desirable as well as economical. Take these golf shoes, for example.

Golfers for years were annoyed by spikes that tipped, and dug into the feet instead of the fairway. The Old Colony Shoe Company did something about this. It developed a golf shoe with an inner steel plate to which the spikes are anchored. To prevent rust, the steel was cadmium plated. Golfers went for the shoe. They still do, but what they do not realize is that now the plate in their shoes is made not of steel but of Revere nickel silver, spring grade, which is inherently rust-proof and needs no plating whatever.

In making this switch, Old Colony was adhering to its customary policy of making the best shoes it knows how to turn out. Nickel silver costs more per pound than steel, but it was selected because it provides absolute assurance that the plate is equal in quality to the rest of the shoe materials. However, when the cost figures were in, it was discovered, surprisingly, that the nickel silver plates cost less than the steel ones, due to elimination of the plating and associated operations . . . Naturally, before the final decision was reached to use nickel silver, careful tests were made. Revere cooperated in these and was delighted when the metal proved itself on the basis of service. That it also has the advantage of economy is just so much the better . . . Quite often it is true that cents-per-pound are not as important as quality service and cents-per-finished-part. Revere is always glad to collaborate in studying such problems.

●

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WALTER G. PATTON

• Strikes in supplier plants pose a serious threat to auto output . . . Factionalism again threatens the UAW-CIO . . . GM announces earnings of $4.55 per share for 6 months of '48.

DETROIT—This is a critical week for the auto industry. For the first time in several months, strike paralysis seriously threatens the industry's production totals. At the moment, assemblies at the Lincoln and Hudson plants in Detroit and the Willys-Overland plant in Toledo have been suspended. Output of the Chrysler plants is also seriously threatened. The removal of molds owned by the car makers from a rubber plant on strike is said to have averted a serious shortage in at least one major auto factory. Heavy duty truck production at Ford and GM has also been curtailed as a result of the strike at Timken-Detroit axle which is now going into its fifth week.

UAW-CIO is threatening strike action at Chevrolet Flint and Electric Auto-Lite at Toledo. The union is protesting an alleged speedup at Flint. At Toledo the local is demanding extension of a 13 cents pay boost to 2500 non-production employees.

Both union shop and wages are said to be at issue in the Campbell, Wyant and Cannon strike which began June 14 and poses the most immediate threat to continued high output by the industry. This strike has already closed five auto plants.

In the Timken-Detroit stoppage the union is demanding proportionate increases in an incentive pay plan as well as a general 13 cent pay increase.

Failure to untangle the snarls in these key supplier plants could have some serious immediate repercussions in the industry according to most observers. The general practice of auto producers is to carry large supplies of blocks, crankshafts and camshafts. It is now evident that any banks of these parts available at the start of the CWC work stoppage have been reduced to very low levels—if they have not already been liquidated.

With Chrysler, Ford and several prominent independents involved, the lost production resulting from a prolonged strike at Muskegon could not easily be made up in the months ahead, even assuming further parts shortages or a steel bottleneck does not develop later.

As matters stood this week there was no noticeable improvement in steel supply. The possibility that entirely unpredictable tie-ups would develop in the wake of the upset to the steel basing point system could not be overlooked as a potential threat to auto output. Meanwhile, large steel users indicated that for the present at least there was litle change in the steel distribution picture.

* * *

DESPITE sparodic strikes in auto suppliers plants, most sources here agree that the third round of wages is now virtually completed. At the outset it appeared that a 10 cent wage boost would be the upper limit for any pay increases. When the steel industry reduced prices and announced that it was holding the wage line, the case for higher wages appeared to be seriously weakened.

Even when the union turned away in disgust from Chrysler's six-cent wage offer the case for holding the wage line—and the auto price line—looked promising. During the Chrysler tie-up, the GM settlement calling for a 11-cent wage boost tied to the cost of living was reached. Shortly thereafter, Chrysler settled at 13 cents and the race to embrace the new wage pattern was on.

With the exception of the recent Dow Chemical settlement, auto firms here have followed the Chrysler lead, preferring to wait and see what develops in the GM wage scheme. At the moment it seems reasonably certain that a further two-to-three cent GM wage increase will come when the U. S. Bureau of Labor statistics announces its latest cost-of-living figures.

Some sources are predicting that the present inflationary rush may easily carry the GM wage rate several notches higher before the end of the year.

Most sources agree, however that the UAW-CIO got larger wage settlements than were predicted They are also getting faster increases in the cost of cars and the cost-of-living than anyone dared to predict.

* * *

PARALLELING the GM wage plan, the recent Dow Chemical settlement provides for a seven cent raise effective Aug. 1, an additional two cents on Sept. 1 and another cent Oct. 1 and Nov. 1, bringing the total to 11 cents. In addition, a bonus will be paid quarterly based on the Bureau of Labor Statistics Index. The July 1 index number of 170.5 is the base figure. Each quarter the three monthly figures for the preceding quarter will be averaged and one cent bonus will be paid for each point the index rises above 170.5. If the index falls below 170.5 wages will not be cut Before the present settlement, Dow hourly rated employees were averaging $1.65 per hr.

Management has won some concessions in the current negotiations. GM has, for example, got a highly desirable two year contract The Chrysler agreement is reopenable for wages only in 1949. The Ford contract runs for a year only Contracts for most of the independents will continue in force until

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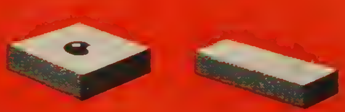
HOKE  USA

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1950. For the present, a rash of fringe demands for company-paid insurance, retirement funds, hospitalization and sickness benefits lie dormant. But no one was predicting these demands would die.

* * *

Intense factionalism has raised its head again at UAW-CIO headquarters. This week Richard T. Leonard, a former vice-president, took Walter Reuther and other union leaders to task for their failure to obtain pensions and better health and life insurance programs for GM, Ford and Chrysler workers.

At the same time Leonard served warning on Communists who hate Reuther to stay clear of the new movement.

The Leonard group purports to represent 100 UAW Michigan locals. The movement is composed of deposed former local union officers, including several ousted board members.

SPEAKING at a Detroit meeting tast Sunday, Leonard said his group is asking for pensions, social security and adequate life insurance in all future labor contracts. He also demanded greater union activity in politics.

"Under no circumstances will any political party, such as the Communist Party, have a voice in this trade union group," Leonard emphasized.

Replying to the Leonard threat to his leadership, Reuther characterized it as "the same old gang, up to the same old factional tricks."

Reuther contended that the rank-and-file of UAW membership has paid a tremendous price for factionalism in the past.

"They won't permit this, or any other group, to revive factionalism and play politics with their welfare," Reuther asserted.

* * *

A lot of price history has been written in the automobile industry during the last 30 days.

Take General Motors, for example. Late in June GM Truck and Chevrolet announced a boost in truck prices. On July 1, General Motors announced it was raising the price of replacement parts on an average 5.9 pct. On July 24, an 8 pct increase in the price of GM passenger cars was announced. On top of its three successive price increases, the corporation announced net income of $206,763,672 for the first six months of 1948. The earnings announcement came less than a week after the increase in passenger car prices.

After deducting dividends on preferred stocks GM's net income for the second quarter amounting to $110,282,260 and is equivalent t $2.43 per share. For the first hal of 1948 GM earned $4.55 per shar on its common stock, including 1 cents per share received from th sales of GM minority stock holding in several companies.

GM's record earnings were mad possible by net sales of $2,234,705,927.

THE report explained that sale of replacement parts, diesel locomotives, diesel engines, refrigerators and other non-automotiv products continue to contribut substantially to the high dolla sales and record-breaking GM earnings.

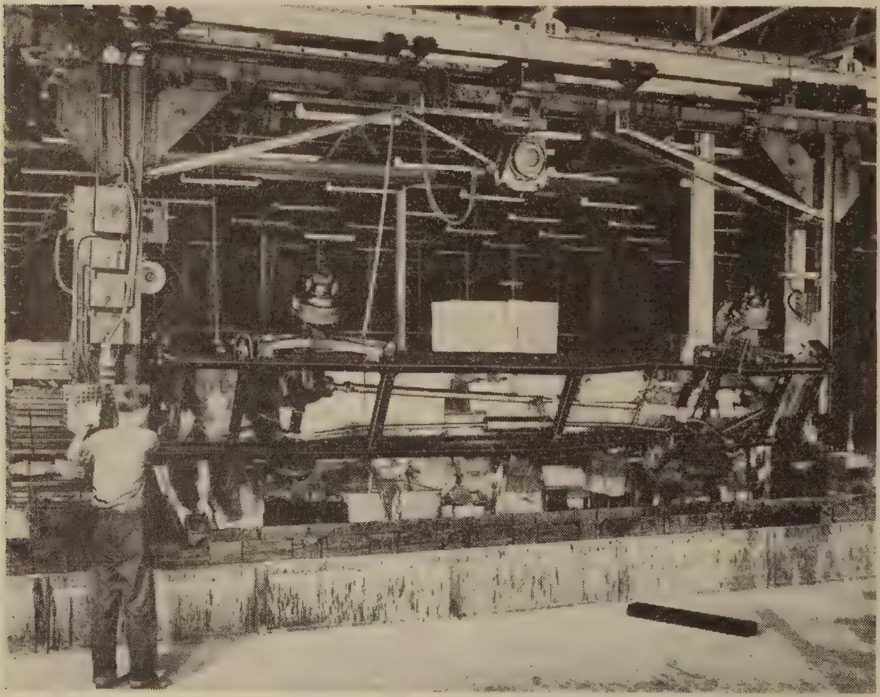
GM argued in the report tha management has much greater nee for capital in the business durin the present period of inflation.

"Capital employed in business today must be increased even wit the same amount of physical output." The report also adds tha plant costs are more than doubl the prewar figures.

Although not specifically mentioned in the report, it is practicall certain that GM wages will have t be raised at least once by a minimum of three cents per hr unde the new wage agreement. Meanwhile, during the past six month GM's net working capital has increased from $865,373,105 t $1,030,981,729. Simultaneously th value of cash on hand and U. S Government securities increase more than $200 million.

As usual, GM seems to be wel prepared financially for whateve the inflationary winds happen t blow its way during the month ahead.

QUICK TURNOVER: Frames varying over a wide range of sizes present something of a problem as they move down the assembly line of the Studebaker plant at South Bend. Up to the point shown in this picture the frame has been upside down. Here an electric, automatically controlled hoist system picks up the frame, quickly turns it over and sets it back on the conveyer.



Sharon Buys Coal Mine

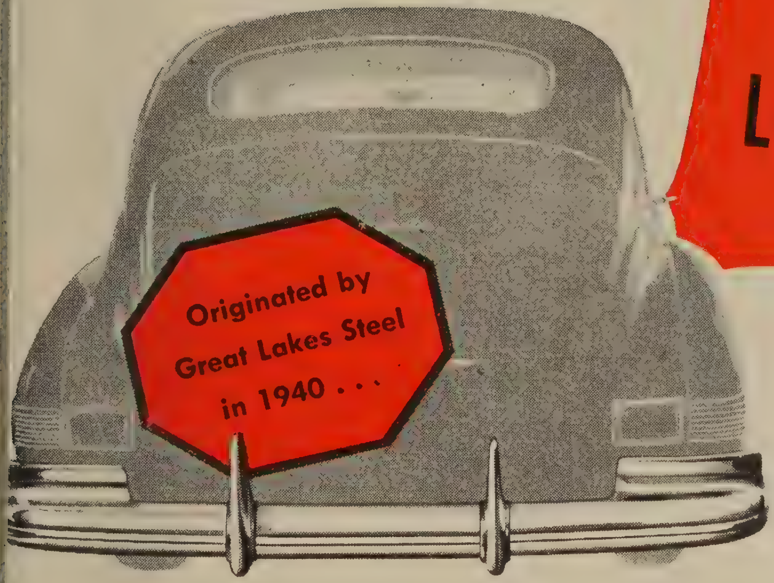
Sharon, Pa.

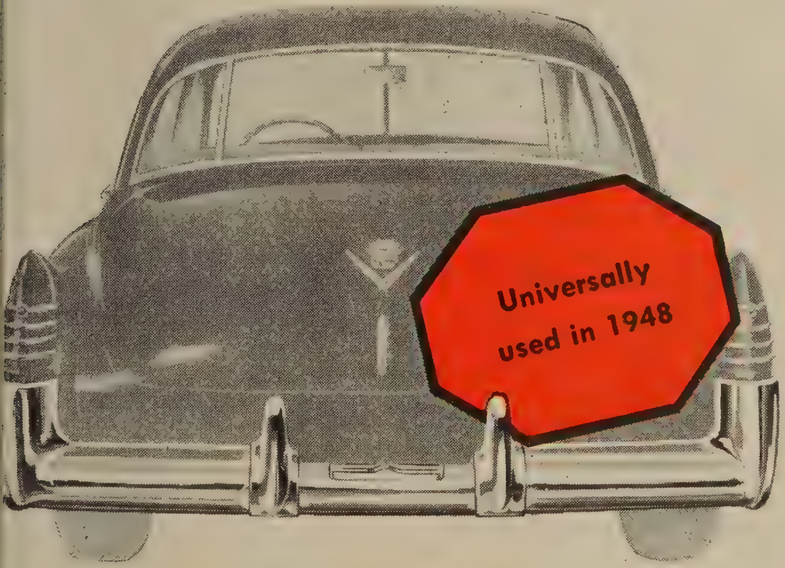
• • • **Sharon Steel Corp.** has concluded all arrangements with Jamison Coal and Coke Co. for the purchase of Rachel Mine, located 12.5 miles west of Fairmont, W. Va.

Sharon Steel Corp. is proceeding with the repairing of the shaft which had partially caved in during September, 1947. This work will be completed the latter part of this year. It will enable them to develop the coal property which was acquired with the purchase of the Domestic Coke Corp., Fairmont, W. Va., in January of this year.

Another First for Great Lakes Steel

Cold-Stamped Bumpers OF High-Tensile Low-Alloy Steel


Originated by Great Lakes Steel in 1940 . . .



Over eight years ago the Great Lakes Steel Corporation applied N-A-X HIGH-TENSILE STEEL to the first cold-stamped automobile bumper. This represented the first practical application of high-tensile, low-alloy steel to the passenger car industry.

Today, passenger car manufacturers have universally recognized the superiority of cold-stamped bumpers which utilize the high strength, good formability, and better surface texture of high-tensile steel. Four out of five cars built today have them as original equipment—concrete evidence of the economic value of this Great Lakes Steel contribution to the automotive industry.

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Washington . . .

EUGENE J. HARDY

• Specific steel plants likely to be targets in atomic attack . . . plans for going underground set aside by NSRB . . . Dispersal seen as best defense.

WASHINGTON — Iron and steel are included among the basic industries first to be studied by the National Security Resources Board in determining the vulnerability of American productive capacity in case of attack by an enemy.

The steel industry as a whole rates about eighth in importance on the Board's list of probable targets should an attempt be made to knock out American industry. Ahead of it is to be found public utility systems, transportation and communication facilities, key military bases, etc. All are vitally essential to fast mobilization for defense. On the other hand, it is unlikely that an attempt would be made to wipe out the steel industry as a whole or even a whole area.

Nevertheless, Board officials told THE IRON AGE, any coordinated and planned attack on industry would certainly include bombing of specific companies or plants which produce special steel essential to military purposes. This is why the industry is high on the study list.

On the basis of published information, as many as 7 to 10 atom bombs would be necessary to wreck the steel industry in Pittsburgh. Not only would this be an expensive attack but it would still leave a large percentage of steel productive capacity operating in Chicago and other steel centers.

It is much more likely, from the Board's point of view, that pinpointing attacks would be planned for individual plants in specific areas where special types of metal, such as for armor plate and jet engines, are under production or such steel-making equipment is available.

"Atom bombs are expensive, and fissionable materials scarce," Board officials say. "Any aggressor nation must therefore assess each target in terms of the amount of fissionable material it is considered profitable to spend on its destruction. In other words, in terms of essentiality to war production."

One thing is certain as the NSRB gets under way with its studies. Taking industry underground is out of the question for the time being. The more the Board studies the matter, the more clearly it is seen that such an operation is impractical on a large scale. It would be justifiable only, the Board admits, in cases of smaller plants which turn out highly specialized and critical products on which large amounts of related war production depends.

IN order to be on the safe side, it is entirely probable that eventually the government may build a few specialized underground plants with the advice and help of industry, it is said unofficially.

For the time being, defense planners are placing emphasis upon dispersal and relocation of plants, particularly expansion of present and construction of new facilities. This does not mean, however, that recommendations will be made for wholesale uprooting and relocating of industrial facilities.

In fact, officials say, when the NSRB studies are completed no recommendations of any kind will be made. The Board's report for the industries concerned will point out weak spots in defense, outline ways in which better defense is to be obtained. Action would be strictly up to industry—for its own and the nation's good.

As a preface to the industry-by-industry study of vulnerability, the NSRB has issued a report entitled "Document 66, National Security Factors in Industrial Location." Covering industry as a whole, its purpose is to outline general risks to be expected from atomic or other air attack and to present definite factors to be considered when deciding on new plant sites.

Except in the case of strategically critical plants, the report indicates, the safest places are cities of less than 50,000 population and industrial centers of less than five square miles in area.

"Atomic bombs exploded to date," states the report, "have destroyed almost everything within a half-mile radius of the zero point. Beyond this and extending to a distance of 1½ miles, they caused moderate damage to all structures. Allowing for future developments, it is not expected that an improved bomb would cause heavy damage beyond a distance of three miles from the point of detonation."

It follows that in construction of new facilities, these would be relatively safer if spaced from seven to 10 miles apart. Fissionable materials are so scarce and manufacture so costly, it is pointed out, that "no country in the foreseeable future will have enough (atom bombs) to use one on each city of as few as 50,000 or congested industrial areas of less than five square miles."

In deciding upon where to drop the expensive bombs, the report continues, a potential enemy would likely look for targets in much the following order of importance:

(a) Plants producing an item highly critical to other war production plants; (b) highly inflammable or explosive installations such as petroleum facilities and chemical plants; (c) public utilities; (d) transportation systems including rails, highways and docks; (e) key

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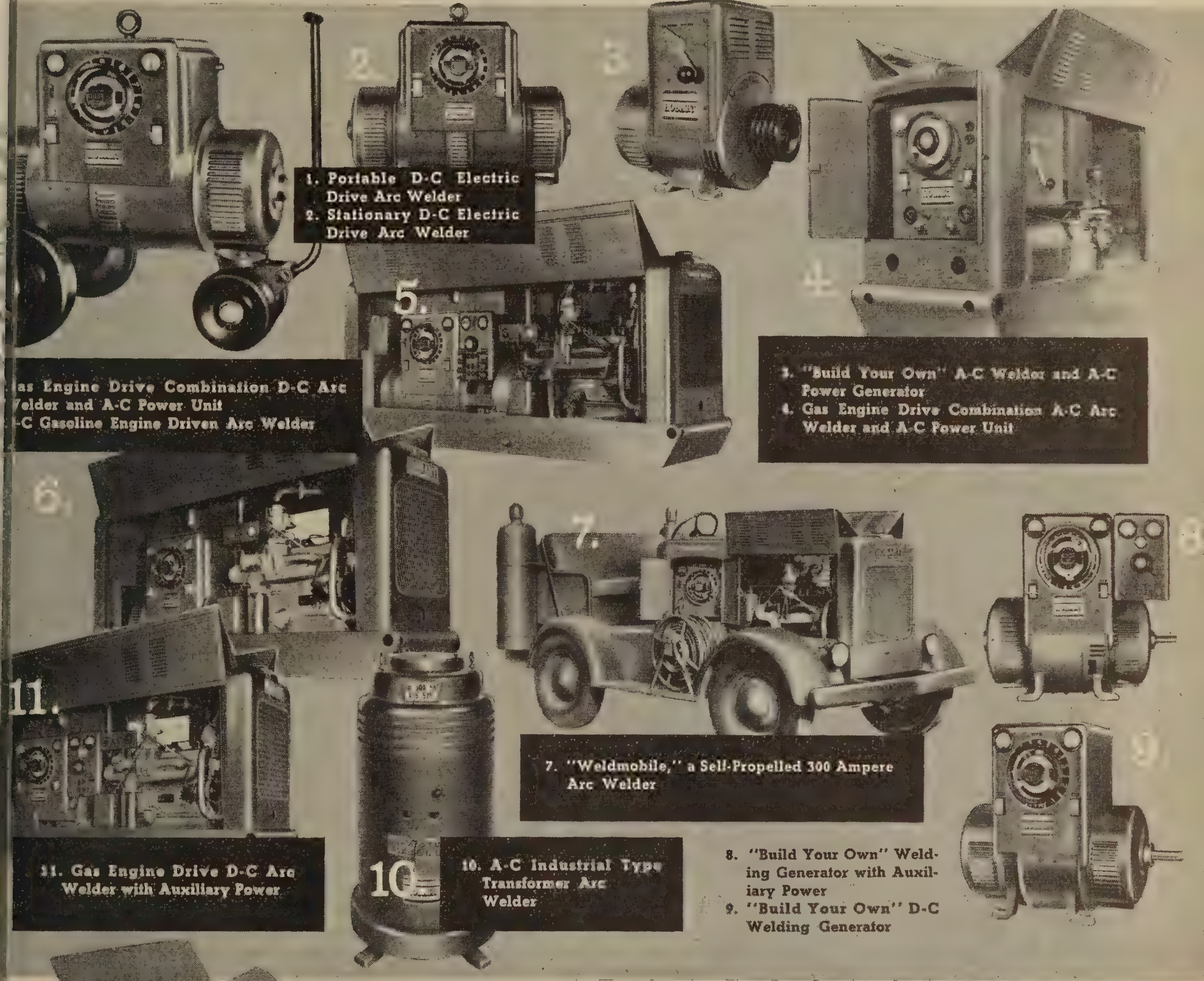

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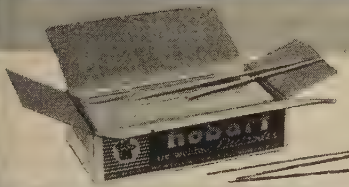
3. "Build Your Own" A-C Weldor and A-C Power Generator
4. Gas Engine Drive Combination A-C Arc Welder and A-C Power Unit

7. "Weldmobile," a Self-Propelled 300 Ampere Arc Welder

11. Gas Engine Drive D-C Arc Welder with Auxiliary Power

10. A-C Industrial Type Transformer Arc Welder

8. "Build Your Own" Welding Generator with Auxiliary Power
9. "Build Your Own" D-C Welding Generator



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Why? Because each welder in the Hobart line is job tested. Designed to do a specific welding job and tested to assure the customer that he's getting faster—better welding at lower cost. That's why Hobart's are the standard of the Industry.

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Send for a sample lot of the new Hobart No. 12 to try on their most difficult welding jobs. They'll like this all purpose electrode—designed for poor fit up work when higher than normal welding currents are desired. Its spatter loss is unusually low for a high current welding electrode. Send coupon for FREE samples!

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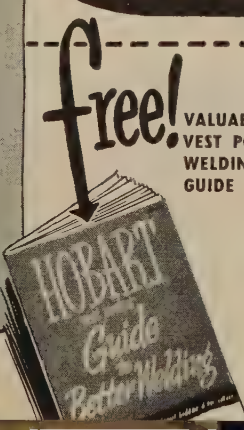

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Complete Line Arc Welder Catalog______ Weldor's Vest Pocket Guide______

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military installations; (f) dams and bridges; (g) air bases and supply centers; and, (h) concentrated industrial plants producing such important items as steel and trucks.

RULES of thumb are laid down for assessing how likely a plant is to become a potential target. First, of course, is consideration of the type of goods produced and how essential to defense those goods may be. Next, it should be determined how close these plants are to others which might become prime targets.

In this latter respect, the Board suggests use of an area map on which a three-mile radius circle can be drawn about the plant or the center of grouped plants. Importance of items produced within this circle may be generally estimated.

It is recognized by the NSRB that in a majority of cases, relocation of established plants and industrial developments is economically unfeasible. The report steers clear of advising any such move. The intention, it is pointed out, is "to alert industrial leaders to strategic significance" of scattered locations in planning future expansion and especially in building complete new facilities.

Billions of dollars are spent annually for new plants and equipment; the Board, charged with responsibility for defense planning from the civilian standpoint, believes that many of these new facilities could be readily constructed along the safety lines it offers.

It would like to see greater development of an industrial trend which became evident during the war, more industrial development in the smaller urban areas. It is found that only about a third of the industrial plants built since 1940 have been located in cities of 100,000 or over; prior to that date, nearly half were established in areas of that size or larger.

* * *

Washington

• • • **Federal Works** Agency has begun mapping plans for storing tens of thousands of units of machine tools and industrial equipment which would be needed for defense mobilization. It is also preparing to take charge of 100 or more specialized war plants which will be maintained in a ready-to-use condition for the same purpose.

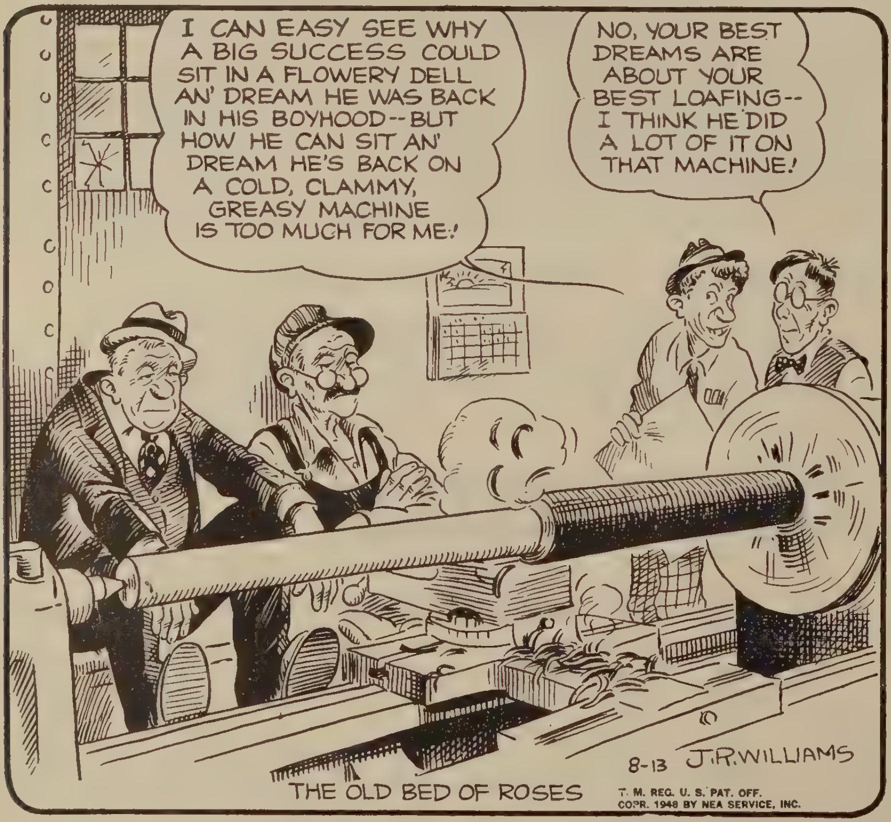
General Philip B. Fleming, FWA administrator, has placed Commissioner W. E. Reynolds, Public Buildings administrator, in charge of planning and administering the program. The first move by Mr. Reynolds was to set up a new division of FWA—the Division of Industrial Properties. He named C. D. Williams of Houston, formerly with RFC and now with WAA, as acting director.

War Assets Administration, due to be absorbed by FWA after the first of the year, has had the responsibility of maintaining many of these properties and storing a large portion of the equipment.

Congress has currently appropriated $10 million for use of FWA in getting the program under way. The lawmaking body was told during committee hearings that at least 60 federally-owned war plants scheduled for standby status would be turned over to FWA before 1949.

The properties and equipment to be preserved are designated by the Secretary of Defense.

THE BULL OF THE WOODS BY J. R. WILLIAMS


I CAN EASY SEE WHY A BIG SUCCESS COULD SIT IN A FLOWERY DELL AN' DREAM HE WAS BACK IN HIS BOYHOOD--BUT HOW HE CAN SIT AN' DREAM HE'S BACK ON A COLD, CLAMMY, GREASY MACHINE IS TOO MUCH FOR ME!
NO, YOUR BEST DREAMS ARE ABOUT YOUR BEST LOAFING-- I THINK HE DID A LOT OF IT ON THAT MACHINE!
8-13 J.R.WILLIAMS
THE OLD BED OF ROSES
T. M. REG. U. S. PAT. OFF.
COPR. 1948 BY NEA SERVICE, INC.

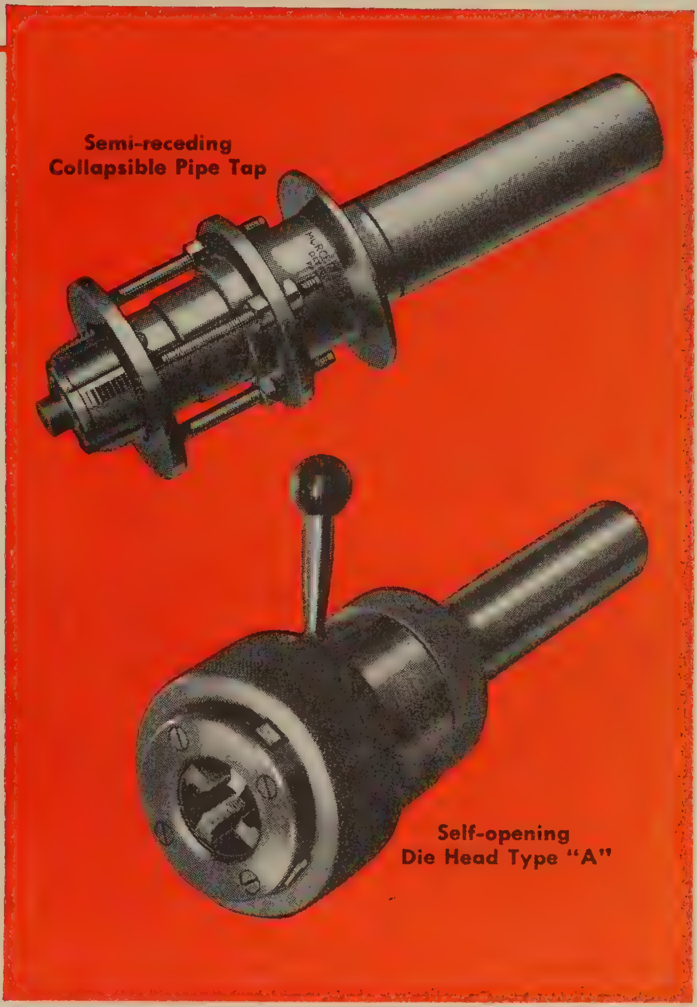
A-L Advances Stainless

Pittsburgh

• • • **Allegheny Ludlum** Steel Corp. has announced the first general increase in stainless steel prices it has made in 2½ years. Effective Aug. 2, prices of all Allegheny Metal stainless steel products manufactured and sold by the company will be increased 10 pct. The increase includes both base prices and extras. Per pound price will be rounded out to the nearest quarter cent.

The company explained that the increase was forced by rising production costs. Since February, 1946, when the last general increase was announced by the company, every single item of cost has advanced. Raw materials, it was explained, have increased to a point where it is impossible for the company to maintain its "hold the line" policy where stainless is concerned. Since the last general stainless increase, for instance, nickel, one of the principal alloys, has gone up approximately $210 per ton. Another principal alloy, ferro-chromium, has increased in price by about $70 per ton. The basic metallics used by the company in making stainless steel have more than doubled in cost during that period

A BETTER, MORE ECONOMICAL METHOD OF THREADING PIPE


Semi-receding Collapsible Pipe Tap
Self-opening Die Head Type "A"

The Murchey Pipe Tap

illustrated is a semi-receding, collapsible unit for cutting taper threads from 1¼″ to 7″ in diameter in cast iron or other materials of similar hardness. Larger sizes are available. For harder materials, the Murchey full receding tap is preferable. Either is used on standard automatic screw machines, drill presses, turret lathes, hand screw machines and special threading machines. These tools can also be arranged to cut straight threads. Both are available in the lever-operated or rotating type.

The Murchey Pipe Die

Types A and C are used for cutting taper pipe threads from ⅛″ to 6″. Larger sizes are also available. Type A is a stationary pull-off unit for use on machines where the tool is stationary. Type C is a yoke-operated tool for use on machines which rotate the tool. Excellent production records have been achieved by these tools on a wide range of pipe threading work.

2935

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MURCHEY MACHINE & TOOL CO.
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Lowest cost per thread . . .
WITH MURCHEY TOOLS

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SUBSIDIARY OF THE SHEFFIELD CORP.
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Manufacturers of collapsible taps, self-opening die heads (tangent and radial chaser types) and special threading tools

West Coast . . .

ROBERT T. REINHARDT

• Metalworking industries continue to be drawn to southern California at high rate although low cost steel is still only a hope.

LOS ANGELES—That irresistible lodestone underlying this southern end of California which has drawn millions of people from the far corners of the world to create the motion picture capital of the world; the playground of the world; the graveyard for those of declining years; etc., etc., ad infinitum; is functioning with greater force than ever to attract metal working industries.

Whether fear of atomic bomb attacks in centralized areas of industry; or the actual and potential availability of steel in this section of the country; or the indisputable fact that this is a growing market is activating the lodestone is relatively immaterial—the fact is that some very important metal users are coming here.

The National Security Resources Board has recently issued a booklet telling industry how to safeguard its plants against atomic bombs. The suggestion for the most effective protective is that the plant be located where the enemy could least afford to drop one of the expensive missiles. Strangely enough, this large community seems to fit this requirement. In spite of the fact that many industries important to national defense and aggressive warfare are located in Los Angeles County, this area would be a poor target for an A-bomb because of the wide dispersal of strategic targets. It would require many such bombs as were dropped at Hiroshima to destroy the Kaiser steel plant at Fontana, 50 miles from the center of the city; Columbia Steel Co.'s plant at Torrance, 20 miles from the city hall; Bethlehem Pacific Coast Steel Corp. plant about 8 miles from the city hall; and to wipe out the aircraft plants, aluminum processors, tool shops, and the hundreds of other key plants. It has been estimated that in the relatively congested area of Pittsburgh, Pa., at least ten atomic bombs would be needed to destroy steel production there.

It may be then, that some far sighted and pessimistic executives are selecting this area for plant expansion on the grounds of reasonable safety.

Local business leaders are inclined to pooh-pooh the defense angle and attribute the influx of metalworking plants to the increasing avaailability of steel as evidenced by expansions recently completed by Bethlehem, announced by Kaiser and proposed by Columbia.

Bethlehem has just about doubled its ingot capacity by putting into operation its 50-ton electric furnace; Kaiser is spending $18.5 million to increase ingot production and finishing facilities; and Columbia is champing at the bit to get going on its announced program for the installation of a $30 million cold-rolling mill. This is being held up only because Tom Clark of the Dept. of Justice can't seem to make up his mind whether it is in the best interests of the taxpayer for Columbia to have possession of the former Alcoa aluminum reduction plant at Torrance. Columbia legally purchased that plant, which has been gutted of its electrical equipment for aluminum production, from WAA, but Mr. Clark has been dilly-dallying about okaying the transaction and is being roundly criticized by those in this section of the state who need the cold-rolled sheets which might be produced there. Equipment for the rolling mill has been on order for almost a year and Columbia may soon have to find another place to use it if the deal is held up much longer.

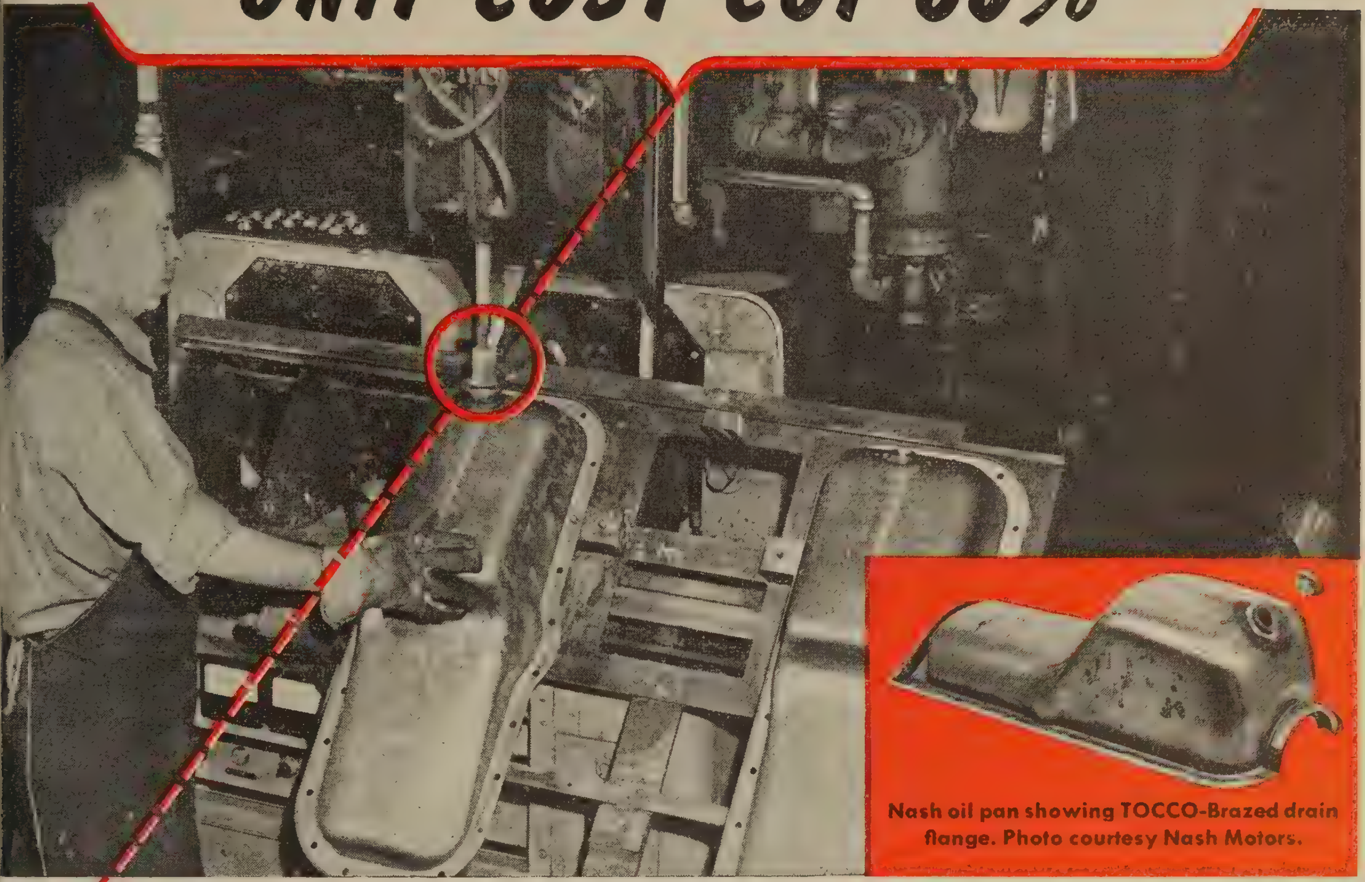
HOW much effect the f.o.b. price system is having on the movement of metalworkers to this area is debatable. While complete analysis of the situation is still to come, there is considerable feeling among business men here that being close to local producers offers them little, if any, advantage pricewise.

Kaiser, the independent producer within 50 miles of the heart of the industrial section of Los Angeles, has established a price scale at least equal to, and in some cases higher than his competitors, to the sorrow of some of his best friends and well-wishers. It is little solace to them to know that Kaiser Co., Inc. has a terrifically high debt to the Reconstruction Finance Corp. Sympathizers agree that Kaiser policy is not unwise although some indicate that the shaving of a few dollars a ton now would be an excellent way in which to win friends and influence future customers.

A case in point is that of Taylor Forge Co. which recently bought from the WAA for $850,000 the old Kaiser-operated shell plant which is located within 200 yd of the finishing line of the Kaiser Co. rolling mills. This company intends to manufacture spirally welded pipe of 5-in. diam and larger from skelp produced at the Fontana plant, and to turn out heavy forgings from Kaiser billets. Under present conditions, with demand high and consumer acceptance at almost any price, Taylor Forge will probably be able to sell its entire output without trouble. However, what will happen when conditions become competitive is the question. Perhaps that period of competition is so far in the future that by that time Kaiser Co., Inc. will have been able to pay off its admittedly high funded debt and can then lower its prices to give full advantage to its customers.

National Electrical Products Co. of Pittsburgh, Pa., is another manufacturer recently lured to this area. The old Joshua Hendy plant at Torrance has been purchased by

PRODUCTION TRIPLED!
UNIT COST CUT 60%



Nash oil pan showing TOCCO-Brazed drain flange. Photo courtesy Nash Motors.

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Even if your products are entirely different in size and shape TOCCO can probably provide similar cost reductions and production increases for you.

● *Nash Motors,* Kenosha, Wisconsin reports the following benefits from TOCCO Induction brazing of drain flanges to automobile oil pans:

1. PRODUCTION TRIPLED — Using a hand torch, production was only 21 brazed assemblies per hour. TOCCO brazes 75 per hour—357% of former output!

2. COSTS CUT —At the same time TOCCO Induction brazing cuts labor and material costs from $12.75 to $4.90 per hundred—a reduction of 60%, representing a saving of $6.00 every hour.

3. OTHER ADVANTAGES —include a neater, better looking brazed joint, and a complete elimination of leakers and subsequent repair costs.

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them for approximately $1 million and will produce electrical conduit within the next 3 or 4 months. To this large user of hot and cold-rolled strip, the location of the plant near Columbia and Kaiser should prove an economic advantage in this area where home and industrial building construction is at an all-time high.

Rome Mfg. Co. of New York is invading the local electrical conduit field by purchasing a part interest in the Anderson Carlson Co. plant at Torrance which during the war made automatic screw machines. A new machine estimated to cost about three-quarter million dollars is expected to be in production here within a month or two. This is another large potential user of strip steel.

DECISION of the Douglas Aircraft Co., Inc. to enter a relatively new field of metal fabrication is said to have been based upon the conviction that the western area offers "great opportunity for development and expansion in this field." For some time Douglas has been exploring the possibility of producing automobile fenders, radiator shells, automobile wheels, and similar automotive components; and the new division, to be headed by Harry Woodhead, a former president of Consolidated-Vultee Aircraft Corp., is the commercial result. Company officials have as yet not indicated the complete scope of their manufacturing activities, but from inquiries of the steel producers in this immediate area it is apparent the operation of the plant is one requiring considerable tonnages of the more scarce steel items, and some doubt has been expressed that sufficient materials will become available for early operation of the new division. Assisting Mr. Woodhead in the organization and operation of the new venture is A. W. Larsen, who worked under Mr. Woodhead at Consolidated-Vultee as purchasing director and who has had experience with General Motors and the Maritime Commission in purchasing.

Portable steel storage files and cabinets are to be made in Inglewood by the Stor-all Corp. of Akron, Ohio, which recently purchased property owned by the Forest Furniture Mfg. Co. and is installing an assembly line. This large user of cold-rolled sheets expects ultimately to employ approximately 250 persons and to operate on a 3-shift basis to handle West Coast business.

Electroweld Steel Corp. at Azusa has for some time been hoping to double its present production of tubing which recently was approved by the City of Los Angeles for use in home plumbing. Because of the scarcity of standard galvanized steel pipe in small diameters this company's products have been accepted for use in a field for which light wall material had previously been considered inadequate. Advantageously located within 30 miles of the Fontana plant of Kaiser Steel, its principal supplier, this company is one of the few in the area to benefit by the f.o.b. price base.

A number of other transactions indicate an expanded demand for steel and other metals in this area. Safway Steel Products, Inc., has purchased the Safway Steel Scaffolds Co. of California and the Beatty Safway Steel Scaffolds Co. of Calif. here. An expanded program for the production of tubular steel products is expected. The APCO Division of Lorraine, Inc., at Santa Monica has been purchased by the National Screw and Mfg. Co. of Cleveland, for the production of screws. Lorraine, Inc. has plans to build a new plant in the local central manufacturing area to replace the facilities sold. American Metal Products Co. of Detroit is building a plant at Whitter, to make automobile and other latches. Parker Appliance Co. has purchased the Los Angeles plant of Air Associates, Inc. of Teterboro, N. J. and an expanded production of flared tube couplings and aircraft valves is expected. Willys-Overland has announced its expansion plans for its Maywood Assembly plant, involving an expenditure of approximately one half million dollars. The acquisition of Consolidated Western Steel Corp. by Columbia Steel Co., which is to be finally voted upon by the stockholders at a meeting on August 27, will have but little effect on production and steel consumption by the company, it is believed. While no official statement has been made, it is apparent that Alden Roach will continue, for some time at least, as active head of this U. S. Steel Corp. subsidiary. However, rumors persist that Mr. Roach is slated for the presidency of Columbia Steel Co. in the near future.

THESE and other developments in the area give ample evidence of a continuing market for western-produced steel. It is reliably reported that there have been eastern manufacturers of steel products seeking plant locations and sources of steel supply who have met an unenthusiastic reception.

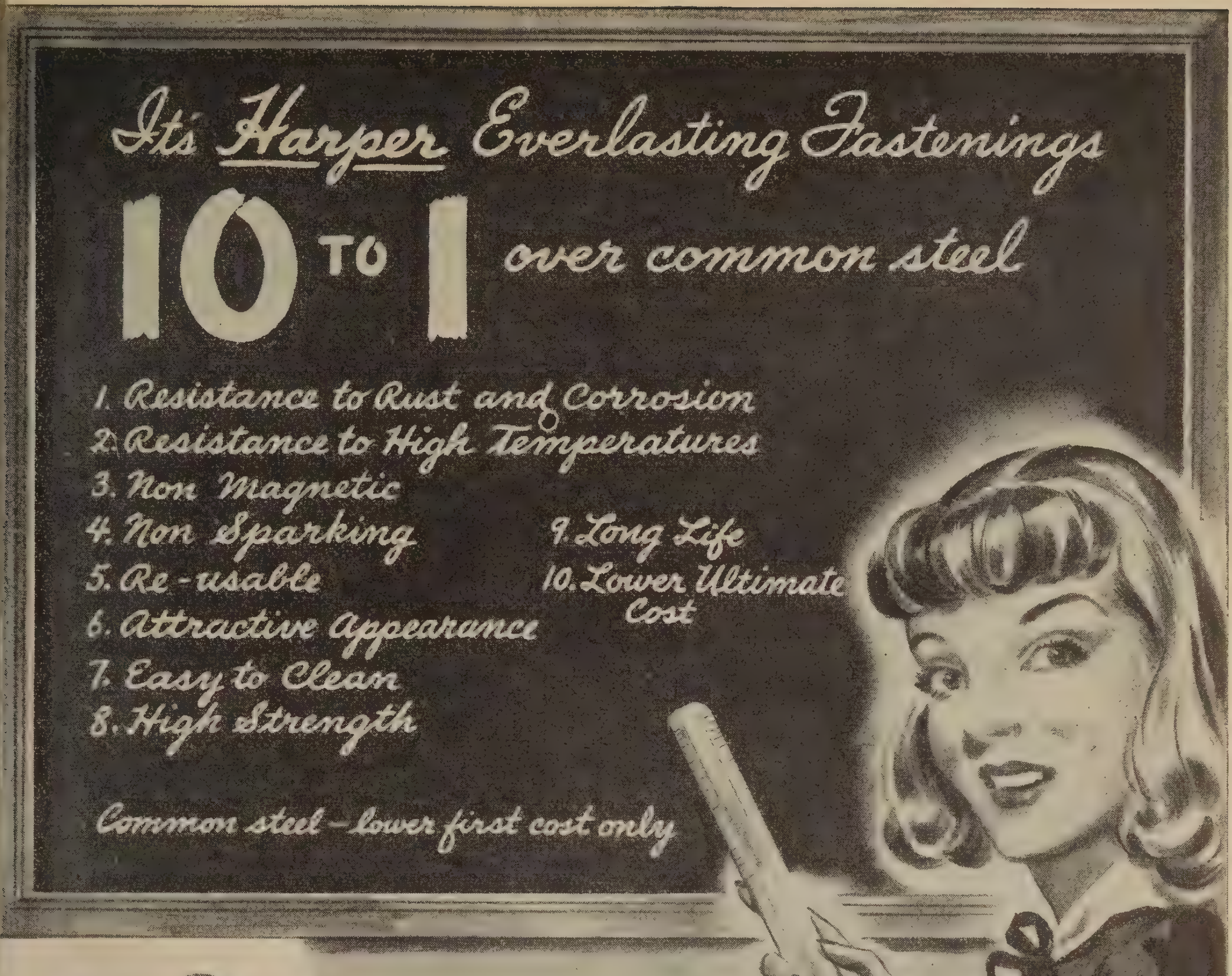
Steel supply in this area may be adversely affected by the shutdown of the Kaiser blast furnace at Fontana which was made necessary late last month through failure of a bottom portion of its stack. However, a good scrap supply may enable the openhearth to maintain somewhat near normal production while repairs are being made, although if a complete reline job is done steel production will drop. This failure came just a few days before completion of the 52-mile rail line of the Kaiser Co. which taps the iron ore at Eagle Mountain acquired by Kaiser Co. last year. Ore from this mine is of a high quality and will considerably increase the efficiency of the Fontana blast furnace within the next month, provided it is in operation by that time. This standard-gage railroad built at the cost of $3,800,000, will shorten the distance from mine to blast furnace to 153 miles.

* * *

SALT LAKE CITY — Chicago Bridge & Iron Co. has let a contract to American Bridge Co. for construction of two additions to its new plant here. The expansion includes a crane runway to handle incoming steel and a second shop about the same size as the first one, which was recently completed. Cost of the additions will be about $325,000, bringing the company's local plant investment to $500,000.

The company last week made its first delivery from the Salt Lake City plant to Standard Oil Co. of California for the $5 million refinery it is building north of Salt Lake City.

Structural Steel & Forge Co., a division of Eimco, is placing equipment orders for its $1 million steel pipe plant in Salt Lake City, but plans are still tentative as to size and capacity of the facility. Morris Rosenblatt, head of Structural Steel & Forge, says capacity will be determined by the steel supply Geneva Steel Co. can guarantee, inasmuch as the new enterprise will get all of its plate from the Geneva.


It's Harper Everlasting Fastenings
10 TO 1 over common steel
1. Resistance to Rust and Corrosion
2. Resistance to High Temperatures
3. Non Magnetic
4. Non Sparking
5. Re-usable
6. Attractive Appearance
7. Easy to Clean
8. High Strength
9. Long Life
10. Lower Ultimate Cost
Common steel—lower first cost only

An amazing combination of advantages in favor of non-ferrous and stainless bolt and nut products . . . only lower first cost in favor of common steel.

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Bolts, Nuts, Screws, Washers, Rivets, Accessories . . . Harper maintains stocks of over 5,000 different items in Chicago and New York . . . large quantities of each. Others being added constantly. Specials made to order from ample stocks of raw materials. Write for catalog.

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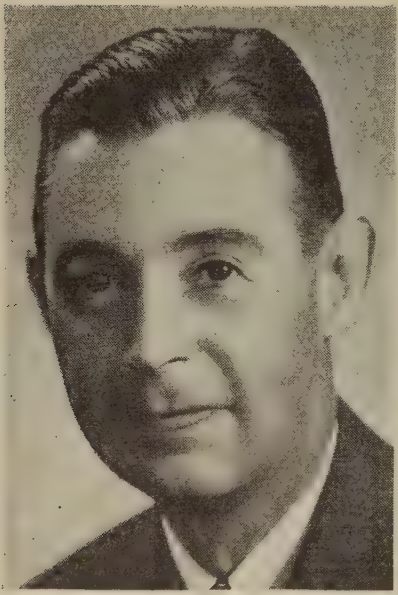
PERSONALS



HENRY B. SHEPHERD, vice-president and member of the board of directors, Betz-Pierce Co.

• **Henry B. Shepherd** has been elected vice-president and a member of the board of directors of Betz-Pierce Co., Cleveland. Mr. Shepherd was formerly associated with the Jones & Laughlin Steel Corp.

• **Charles A. Crowl** has been elected president, Electroweld Steel Corp., Azusa, Calif. Mr. Crowl was formerly vice-president of Talon Inc., Steel Tube Div.

• **Walter R. Turner** has been named vice-president in charge of production of Bull Dog Electric Products Co., Detroit. Mr. Turner joined the company in 1945 as production manager.

• **Myron S. Curtis** has been appointed director of engineering and elected a director of Warner & Swasey Co., Cleveland, succeeding **William J. Burger** who has retired. Mr. Curtis joined the company's Engineering staff in 1940. **Frank E. Joseph** has also been elected a director of the company, succeeding **Thomas H. Jones,** who died.

• **Paul Queneau** has been appointed metallurgical engineer of International Nickel Co. of Canada, Ltd., and its subsidiaries, with his headquarters in New York. **W. K. Sproule** has been named to succeed Mr. Queneau as superintendent of research for the company at Copper Cliff, Ontario. Mr. Sproule was formerly chief physicist of the Copper Cliff research laboratory.

° ° °

• **L. S. Cope** has been appointed head of research and product engineering, Oliver Iron & Steel Corp., Pittsburgh. Mr. Cope was formerly general manager in charge of production.

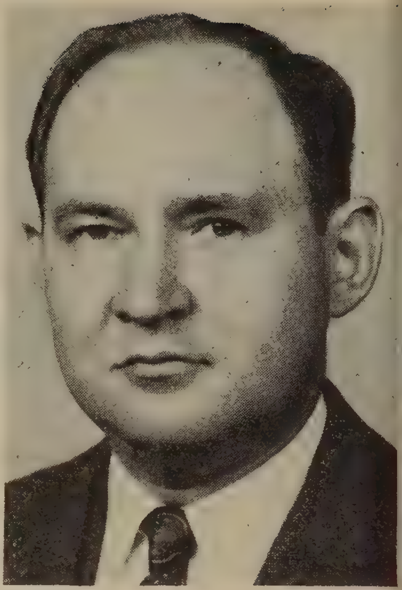
• **Arthur W. McKinney,** vice-president and general manager of sales, National Supply Co., Pittsburgh, has been elected to the newly-created position of executive vice-president of the company.

• **Whitley B. Moore** has been elected vice-president in charge of sales, succeeding **L. M. Klinedinst,** who has retired after 43 years with the Timken Roller Bearing Co., Canton, Ohio. Mr. Moore was formerly manager of the Industrial Bearings Div., had charge of the Steel Sales Div., and was later appointed director of all sales. Mr. Klinedinst joined the company in 1905. In 1924 he was made general manager of the Industrial Div. He was elected a vice-president in 1930 and a director in 1934. Mr. Klinedinst will remain a director of the company and further serve as sales consultant.

• **M. B. Leidy** has resigned as district manager of the Philadelphia district office and warehouse, Latrobe Electric Steel Co.

• **W. F. Huntley** has been appointed assistant to superintendent of blast furnace department, Aliquippa Works, Jones & Laughlin Steel Corp., Pittsburgh. **R. E. Edwards** has been named assistant to superintendent of openhearth and bessemer department and **A. B. Millman,** assistant to superintendent of maintenance. **J. B. Carlock** has retired as chief engineer of plants. **C. F. Seyler,** formerly assistant chief engineer of plants, has been named an assistant chief engineer.

• **A. B. Ordway** has been appointed to the executive staff handling the overall policies of Kaiser industries for the Kaiser Co., Inc., Oakland, Calif. **Jack L. Ashby** has been named vice-president and general manager of the Iron & Steel Div. of the company. **C. Bruce Wood** has been promoted to assist Mr. Ordway on the Kaiser executive staff and **Robert Walker** has been promoted to controller.



HOWARD G. PANKRATZ, industrial sales engineer, Industrial Equipment Div., R. C. Mahon Co.

• **Howard G. Pankratz** has joined the sales engineering and consultant staff of the Industrial Equipment Div., of R. C. Mahon Co., Detroit, as industrial sales engineer. Mr. Pankratz has had broad experience in the industrial engineering field and as consulting engineer on industrial equipment.

• **John C. Richards** has been named general manager of sales, Washington Steel Corp., Pittsburgh. Mr. Richards has been associated with the company as manager of distributors' sales since 1947. **Robert O. Fulton** has been appointed assistant sales manager. Mr. Fulton was formerly chief sales correspondent and joined the company in 1946. **S. M. McGough** has been made sales representative. Mr. McGough was formerly associated with Corey Steel Co.

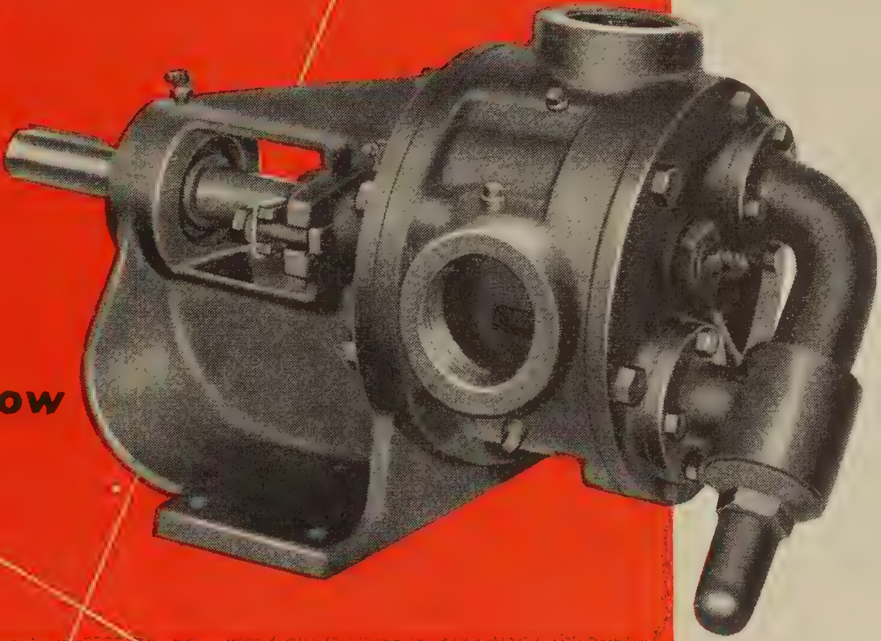
• **Thor M. Olson** has resigned the position of vice-president in charge of sales of the Ex-Cell-O Corp., Detroit. He was also a member of the board of directors. Mr. Olson has been connected with Ex-Cell-O since 1930 when his company, the Continental Tool Works, merged with the larger corporation.

• **Fred T. Miller** has been appointed sales manager, Adel Precision Products Corp., Burbank, Calif. Mr. Miller has been associated with Adel for seven years and prior to his present position was the firm's west coast sales representative.

(CONTINUED ON PAGE 160)

only 2 parts move

in this low-cost liquids-mover!



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Yes, there are only two moving parts in Fairbanks-Morse Rotary Pumps. These exceptionally compact liquids-movers, with their simplicity of design, bring you low-cost pumping at high efficiency. A precision-cut rotor and pinion do all the work. There are no complicated parts to cause trouble . . . no worries about suction leaks . . . no vapor locks.

Mixing tanks, laundry and dry cleaning machinery, machine tools, wherever you use one of these positive acting pumps, you can be sure of definite rated output. There is a constant pumping action . . . no vibration or shocks to affect pump life. Most sizes and modifications are available from stock. Fairbanks, Morse & Co., Chicago 5, Illinois.

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European Letter

• Pressure for reduction in manufacturing costs soon to be universal . . . Placing emphasis on the art and science of industrial management seen as a means to prevent further inflation . . .

LONDON—Evidence continues to accumulate that the too-much-money-chasing-too-few-goods phase of the inflationary problem is waning, even though it is not yet nearly over. Queues are shorter, theatres, restaurants and seaside hotels emptier; prices rather than coupon values restrict the demand for an increasing range of goods. While unemployment remains fantastically low, there can be observed a significant lengthening of the Appointments Wanted columns on the classified advertisement pages, and a corresponding shrinkage of the Situations Vacant. The amount of purchasing power on the home market is still, by any standard, excessive in relation to the amount of goods which Britain can afford to consume; and ominous rumblings from the engineering industry and elsewhere show that a new round of wage increases may begin at any time, in the absence of the firmness and skill needed to prevent it; but with all due caution one can aver that the tide has turned.

While the tide of income inflation can be reversed comparatively easily, the tide of costs is a very different matter. The never-lifted depression which hung like a fog over Britain between the two World Wars was, in part, the product of just such an incomplete reversal of inflation—incomes deflated, costs relatively immovable. Both for obvious political reasons and because there has been some increase of economic knowledge over the past quarter of a century, the exact situation of the twenties and thirties is unlikely to recur; but some of the factors which went to its making are recognizably present once again.

THE most obvious example of the typical post-inflation dilemma is provided by the wireless industry, where the margin between costs and selling prices has dwindled, for the less well-placed firms, to nothing or less; and the troubles of the wireless makers are shared to the full, for no very obvious reason, by the jobbing engineers. Hosiery and woolen textiles face the same dilemma in a form only less acute, and wails of distress are arising from a catering industry which finds its costs rocketing upwards just when demand is unmistakably falling away. The experience of the wireless and hosiery industries is likely to be shared by many others. Pressure for reduction in costs will soon be a universal problem.

The production-at-any-cost attitude still understandably governs policy in coal and in agriculture, and the example thus set is not conducive to cost-mindedness elsewhere. But this is not the most important influence working against resolution in cost-cutting. The level of costs has been for so long dependent on Government action or inaction that business men have lost much of their sense of personal responsibility. There is the profound national conviction, for antedating the war, that competition is immoral and mobility, whether from place to place, from technique to technique, or from job to job, a detestable last resort; a conviction found in its full flower in the trade union movement, but enthusiastically shared by a very large proportion of business men. Costs, in these circumstances, are not something to be tackled but something to be taken for granted.

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No psychological revolution would, of course, make cost reduction easy. The biggest item in most firms' costs is wages, and no serious cut in wage rates is economically conceivable under almost any regime at all. One can cut expense accounts, tighten up on sundries, and prune overheads, but that does not take one very far. To reduce labor costs by the installation of better equipment, by improved factory and office layout, and so forth, is an avenue too often blocked by the resistance of the unions or by the impossibility of getting the necessary machines or the necessary building; and this is, indeed, a well-worn excuse for inaction. In all industries there are firms which, refusing to be discouraged by these difficulties, have in fact kept their costs down or, after a rise, drastically reduced them. In a sense, such a recipe is summed up in the words "good management," comprising a vast number of different skills, ranging from a thorough familiarity with productive techniques to a diplomatic knack for eliciting the cooperation of bright Red shop-stewards. Deficiencies in management, such as undeniably exist over the bulk of British industry and help to account for the rigidity of its costs, are at once harder and easier to remedy than deficiencies of equipment or buildings.

Emphasis on good management as a means of reducing costs does, however, remain within the competence, much of the matter on which business ability has traditionally exerted itself; it has not removed the art and science of management, concentration on which has become more, rather than less, important with the narrowing of other possibilities of cost-reduction. Inflation, whether overt or partially suppressed, does not merely distort the relationship between costs and prices in general, but those between particular costs and prices; between the prices of capital and consumer goods, of luxuries and essentials, of export and home products, between the costs of more and less heavily capitalized industries, between old-fashioned firms and newcomers, between the sheltered and unsheltered types of enterprise. For as long as the process of inflation, both of prices and of costs is going on, business works without a reliable yardstick.

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Industrial News Summary...

- ***F.O.B. Sales Boon to Gray Marketeers***
- ***Sheets Bow to Pipe as Scarcest Product***
- ***Steel Warehouse Prices Still Confused***

GRAY MARKETEERS have been given a new lease on life by the steel industry's switch to f.o.b. mill sale. And just as motor car demand can be gaged by used car prices so steel demand can be measured by current gray market quotations. And those prices are strong. There is a little difference in demand: a year ago the pressure was strongest on sheets. Today the emphasis is on pipe, particularly oil country casing and line pipe.

The f.o.b. mill pricing system forced upon steel companies makes their job of policing their business infinitely more difficult than ever. It never was easy. Previously the steel producer quoted a delivered price. He routed the shipment and was responsible for it until it was delivered. Under the present system the buyer can take title to his steel at the mill. Should he choose to divert it, the mill has no check on its destination. Critics of the industry—those who argue that steel companies should police their sales against gray marketeers—will now have a tough time making their arguments ring true.

All of this gray market activity dashes cold water on those who looked for easier steel supply by now. Detroit reports two big plants closed this week for lack of hot and cold rolled sheet steel. And another automaker has given uneven steel supply as one reason for boosting prices.

Though sheets have given way to pipe as the prime gray market item their prices are still terrific. Prices on prime quality gray market sheets are running at least three times mill quotations. Hot-rolled pickled and oiled sheets are quoted in the Midwest at prices up to $245 a ton; cold-rolled at $340. Between the extremes there are a variety of other prices.

ONE Chicago buyer last week was quoted $185 a ton for 200 tons of 18 to 24 gage 36 x 96-in. hot-rolled pickled and oiled sheets. This sounded like a good price until he learned that the sheets were rejects—and that poor quality was the reason for their rejection at the mill.

The battle among pipe consumers has reached a red heat. Oil well casing is being offered in Chicago at $325 a net ton. The price doesn't seem to concern the many would-be buyers; it is the fact that none has yet been able to establish that the casing is actually made and ready for shipment.

Pipe is so scarce that some of those who need it are getting involved in conversion deals wherein the first commodity is as basic as it can be—iron ore. It appears that some pipe users have decided to start at the bottom by supplying ore to the steelmaker who will furnish the semifinished material to a pipe fabricator.

Some mills have not opened their books for the fourth quarter because they are uncertain of the precise tonnages that will be siphoned off under "must" programs. But most steel users might as well prepare if they can for a 3½ to 5 pct cut in their fourth quarter quotas—that much is virtually certain. Twice as much steel is now moving on Government orders as moved last spring. The fourth quarter will bring cutbacks for the average consumer goods producer.

Orders for stainless and alloy steels declined slightly in July. Whether this is a temporary dip; a reflection of business conditions, or occurred because deliveries in these grades may be catching up with supply is not known in steel sales offices. But there is still a substantial backlog of orders in these lines and sales executives don't expect the new higher prices to pinch off buying. They believe the advances—averaging 10 pct in most cases—will be passed along to the ultimate consumer.

STEEL warehousemen mirror the general confusion prevalent over prices this week. Normally this is a highly competitive field in which low price quotations are quickly met by all sellers in a district. But steel warehouse prices are disorganized right now. Several warehouse executives have told THE IRON AGE that they are uncertain on their costs and on the competitive prices they must meet. On some products they have not even been able to establish a price. Some leveling of warehouse prices is expected within the next few weeks.

Steel executives were privately pleased with July freight car production of 8706 cars, about 1000 more than well informed observers had hoped for. A relatively poor month was anticipated because about 90 pct of the freight car shops either had vacations or staggered operations during the month. One of the major builders which accounted for 1200 of the 10,381 cars delivered in June was out of action from July 2 to 19. Industry observers look for 10,000 or more cars in August.

Steel operations for the week were scheduled at 93.5 pct of rated capacity, down half a point from last week's revised rate of 94 pct.

If the f.o.b. mill system of selling steel remains in effect it is believed that shipments of steel by barge from Pittsburgh will double within the next 2 years. No sudden upsurge in this type of shipment can be expected in the very near future for several reasons: (1) Barge loading and barge facilities are a limiting factor; (2) under present demand conditions customers want steel quickly—and rail is considerably faster. However, as rail rates rise and new barges are launched, this type of shipment will grow. Customers located to take advantage of it will thereby be able to shade steel costs.

KAISER PRICE BOOST—Henry Kaiser has notified stomers that Fontana steel prices will be advanced by average of $30 a ton effective Aug. 15. Referring to her war-built plants that had been sold for "as low as 20¢ the dollar" he said that paying the Government 100¢ on e dollar is and has been a hardship. The price increase, said, "is designed to make the Fontana steel plant an lependent Western steel enterprise—permanent, sound d competitive."

A LONE HAND—The new stainless steel prices of rnegie-Illinois Steel Corp., Pittsburgh, depart somewhat om the straight 10 pct across-the-board increases made other producers. Carnegie's prices were effective Aug. The average increase is approximately 9¼ pct. Revised tras for packing, size and quantity were placed in effect ncurrently.

MORE JETS—Westinghouse Electric Corp. at Philalphia and the Office of the Secretary of Defense have nounced that Westinghouse will reactivate the Navy dustrial Reserve plant at Kansas City. The plant, opered during the war by Pratt & Whitney Aircraft Div., will used to build reciprocating engines for planes.

NEW BATTERY—First coke has been pushed from e new No. 1 battery of 106 coke ovens at Jones & Laugh- Steel Corp.'s Alliquippa works. The ovens, constructed Koppers Co. at a cost of more than $12 million, will oduce 53,350 tons of coke per month. This battery which places the original No. 1 battery of 61 ovens, gives the liquippa works a total blast furnace coke capacity of 5,000 tons per month.

JUDICIOUS DISPOSAL—A complaint issued by the deral Trade Commission in 1937 against the Cast Iron il Pipe Assn. and 35 companies has been dismissed witht prejudice. It was charged that the respondents used e "Birmingham Plus" pricing system to eliminate comtition. It was noted in the dismissal order that the sociation and several of the companies named in the mplaint had ceased operations since proceeding started years ago—but the FTC left the doors ajar to start new tion on a moments notice if deemed necessary.

- **YOUNGSTOWN TOO**—If you can't get steel to them—bring them to you. That seems to be the trend in steel producing cities today as a result of the Supreme Court ruling against basing point selling. Pittsburgh and Los Angeles have been working like beavers to get fabricators to relocate within their city limits. Now the Youngstown Sheet & Tube Co. has set up an industrial development department to assist in attracting new steel consuming plants to the mill area. Frank Purnell, president of the company, has advocated congressional action to legalize basing points—but in the meantime wants to offer any assistance possible to those interested in locating in the Youngstown area.

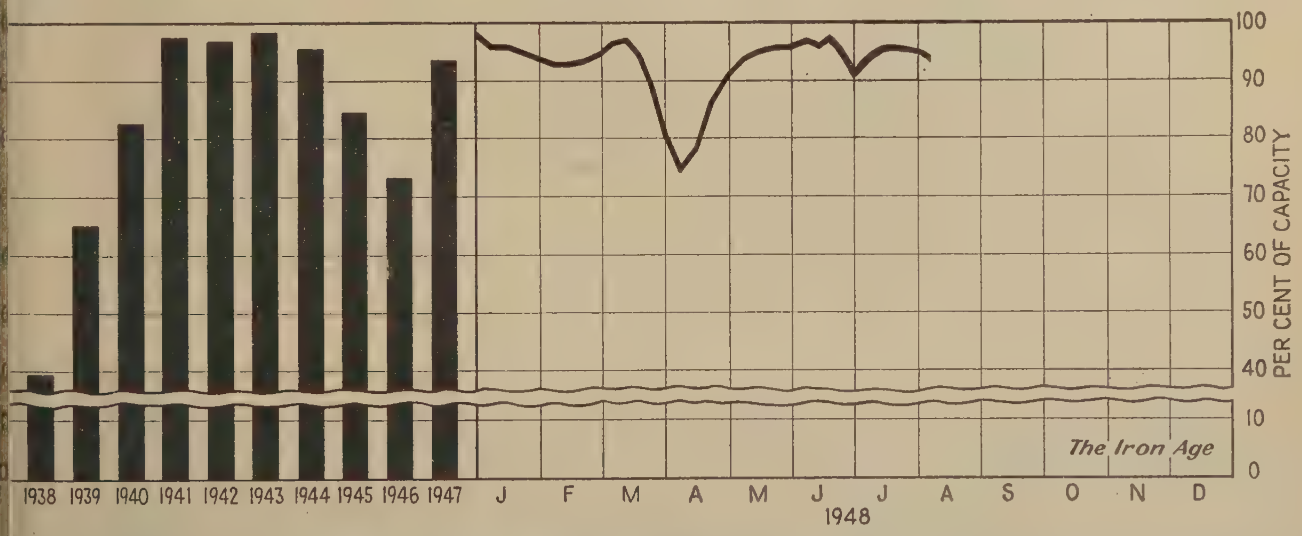
- **A BIG LOAD**—The keel of the first supertanker—with a 3000 car capacity—has been laid at the Bethlehem yards, Quincy, Mass. The tanker will have a gross tonnage of 28,000 tons and will hold 240,000 bbl of oil. It is the first of 5 to be constructed at the yard.

- **A SLIGHT IN**—Limited importation of tin-bearing alloys will be permitted under a new policy adopted by the Dept. of Commerce. However, total tin supplies in this country won't be affected because allocations of pig tin will be cut an equivalent amount. We won't get too much anyway since large purchases by the U. S. would deprive other nations of these alloys.

- **INTEGRATION**—The Alan Wood Steel Co., Conshohocken, Pa., is contemplating the installation of a 30-in. hot rolled strip mill at a cost of $8.9 million. It will be partially financed from the public sale of new securities. The mill will enable the company to reduce its conversion costs and also expand its line of finished steel products.

- **SHIPPING RECORD**—Shipments of finished steel products in the first 6 months of this year exceeded those of any half-year in war or peace. This record comes despite furnace curtailments due to the coal strike. Total shipments for this period were 32,250,000 as compared with the wartime high of 31,766,000 tons established during the first half of 1944, according to American Iron & Steel Institute.

Steel Ingot Production by Districts and Per Cent of Capacity



Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
96.5	90.0	91.0	87.0	95.0	99.0	96.0	102.0	98.0*	100.0	107.0	78.0	98.0	94.0*
96.5	91.0	90.5	87.0	94.0	99.0	99.5	102.0	102.0	89.5	107.0	78.9	98.0	93.5**

FINE INCREMENT SPEED CONTROL—Multi-point, fine increment motor rheostat controlled from operators position, eliminates compromise speed settings, inevitable with conventional gear changes. Exact cutting speed assures maximum production.

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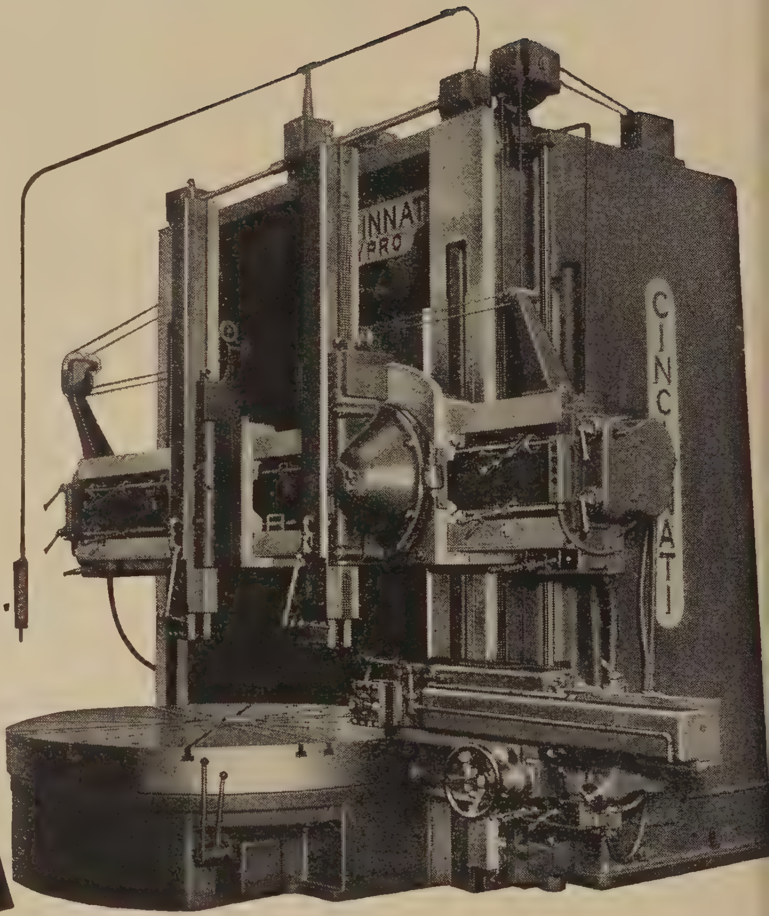

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CINCINNATI, OHIO

Pittsburgh May Double Barge Shipments of Steel Within 2 Years

Question Is How Fast Facilities Can Be Expanded; F.O.B. Sales Forcing Change

○ ○ ○

By THOMAS S. BLAIR
Associate Editor

○ ○ ○

ittsburgh

• • If the f.o.b. pricing system ticks, barge shipments of steel roducts from the Pittsburgh dis-rict to the South and Southwest re expected to pick up as fast as acilities can be expanded—prob-bly 100 pct in the next 2 years.

The long range view of the situa-ion, with the customers calling heir shots as to transportation sed, logically points to stepped-up iver movement. In the present arket, however, the change is kely to be gradual, as customers re glad to get material by any eans whatsoever and many are so trapped for steel that they want t as fast as possible which—in pite of some phenomenally delayed ail deliveries—is not by river.

For the moment at least, most ustomers' orders simply read "ship s usual." And the mills aren't nocking themselves out to use the ivers, except to their own depots, s they hesitate to weaken their re-tionships with the rairoads and re in most cases limited in their acilities for shipping by barge. 'ew of the Youngstown-Wheeling-'ittsburgh producers can so handle ver 15 pct of their capacity.

Tables I and II give an idea of he general economies possible with arge shipments. Table I is based n actual barge line quotations and hows what can be done for a river hipper tomorrow. Table II is a ore or less idealized picture of hat might develop using the rail-ruck-barge terminal proposed for 'ittsburgh. The considerable dif-erence in savings reflects the ma-erials being shipped—pipe versus heets—and also the tonnages in-olved.

Table I is for carload lots of pipe —and the first carload lot business ince pre-NRA days is now moving n the river—while table II is for argeload sheet business on which he tonnages permit lower rates, lthough the prices in the table ave been broken down to a carload asis. Also, particularly with table I, it should be noted that the dif-erential is figured only to the river orts, which are not overly large teel consumption points in them-elves, and that for interior points here will be additional rail or trucking charges chopping away at the differential.

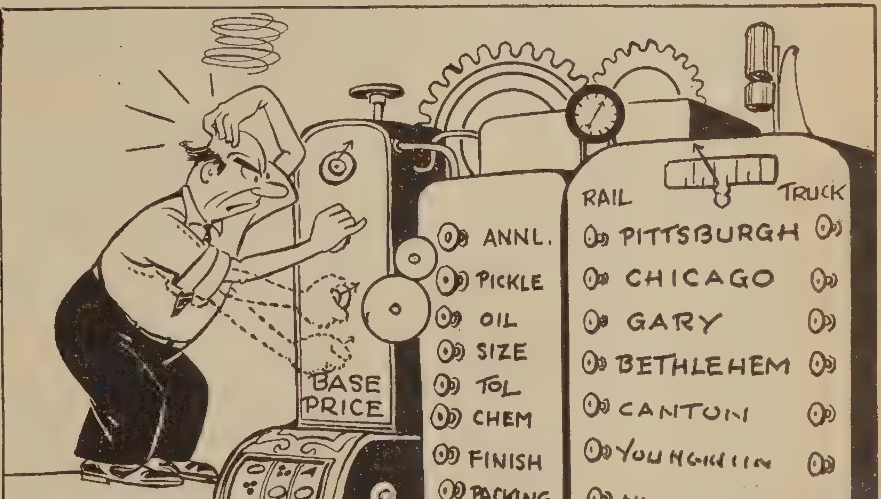
Opinions on the extent to which barge shipments can be immediately stepped up vary considerably. The barge builders hold that there is a shortage of barges, and the fact that the best delivery that can be quoted on new orders is next August, one year away, lends weight to their statements.

A voluntary allocation program of steel for barge construction is fairly well set with 20,000 tons a month beginning in the fourth quarter to be diverted to barge construction. This is to provide 75 to 100 new barges per month. Of these as many as 75 pct are expected to be tankers unsuitable for steel products and not all of the remaining barges, possibly 20 per month, will be on the Pittsburgh route.

Builders expect that additional steel for barges will cut down the delivery time somewhat and will bring forth new orders, as right now customers hesitate to contract for $25,000 barges on such a long range basis.

At the present time, however, barge movements are predominant-

It May Come To This



ly upstream—70 to 80 of the shipments. Presumably, then, there is plenty of room for downriver business from Pittsburgh. And if the balance should swing to the other direction it would make more sense for empties to be towed back against the current anyway.

New tow boats, capable of taking the equivalent of 300 full railway cars in a single tow, are of comparatively high speed, and as a result have loosened the barge supply and upped capacity somewhat. All in all, the limit to increased river movement is more imposed by handling facilities than by lack of barges. Facilities at Glassport, Aliquippa and Conway are already being expanded, especially for handling pipe which is expected to be a big item in river business for at least several years.

TABLE I

Comparative Rates for Carload Shipments of Pipe to the South and Southwest

For carloads of pipe (40 tons) originating in Aliquippa, Allenport, Etna, McKeesport, Monessen, Ambridge and Economy, and using Aliquippa, Glassport or Conway (Baden) as the northern gateway:

DESTINATION	Rates in cents per 100 lb		
	By Rail	By Barge	Differential
Memphis	81	69	12
New Orleans	92	78	14
Houston	102	89*	13
		93†	9

For carloads from Youngstown using Conway:

DESTINATION	By Rail	By Barge	Differential
Memphis	79	66	13
New Orleans	92	78	14
Houston	98	85[1]	13
		89[2]	9

* via New Orleans
† via Memphis

These rates cover "through transportation" from origin to destination. Rail hauls to and from switching points or ports of interchange, and transfer expenses between rail cars and barges are included.

Mill facilities are tied up somewhat by large incoming shipments of their bulk raw materials—limestone, coal, scrap, etc.—which demand wharf space and handling that might otherwise allow more outbound traffic.

There are extremely difficult problems ahead for the mills too if they permit customers to specify barge shipment. If the mills were to try to load their orders onto barges at their own facilities, the tonnages involved for efficient handling would require Superman to handle the production scheduling, and probably the production itself. And, as pointed out, only a very small percentage of their output can be handled at their own docks. The answer may be for customers to arrange for outside barge lines to take the orders by freight car and load on barges at some northern terminal to make the long haul by water. As in table II, this would stick them with a switching and handling charge before the order ever hit the rivers, but savings would still be considerable in many cases. On such a system, the mills would have no squawk since they'd be loading onto freight cars which they are best set up to do. However, the stickler is that contract carriers at the northern gateways again have limited terminal facilities—much too limited for the potential traffic that may develop. How much they can expand is problematic—but they're all weighing the possibilities.

The time element, in the present market especially, is against barge movements. Material to Houston, for instance, takes about 8 days by rail unless tie-ups occur. By water, the average time interval is about 23 days. To Cincinnati, it is 2 or 3 days by rail and probably 6 to 10 days by water depending on how long the material has to lay—up to a week—until a tow is assembled. When warehouses fill up again, however, this drawback will go out the window.

Estimates for 1948 put river traffic out of the Pittsburgh area at 1,290,000 tons of finished steel of which as much as 75 pct will be pipe. In addition, 98,000 tons of semi-finished is expected to move and there will be large tonnages of local traffic in interplant hauls. In most cases producers expect barge shipments to be up from 20 to 50 pct compared with 1947, depending on how successfully facilities can be enabled to take the increased burden.

Pig Iron Shortage Threatens to Halt Some Foundry Work

Boston

• • • **So far no reports** have been received of New England foundries being forced to close for lack of pig iron despite the fact 60 pct of them are normally supplied by the Mystic Iron Works and the Everett furnace is out for repairs and has no iron in stock.

Several foundries report they possibly can get through August by a more liberal us eof cast in mixtures. Others are not so optimistic. Others report they have just about reached the limit in the use of cast in mixtures.

Efforts of politicals and civic groups to get steel mills to agree to make up the New England pig iron shortage so far have not fruited. Some domestic pig made outside New York is filtering in, but to date it has not been a drop in a bucket.

In the meantime foreign iron is offered foundrymen, in some cases at fantastic prices quite beyond reach of melters. The lowest priced iron offered is Belgium in full cargo lots at $74 a ton landed Boston.

Swedish iron is offered at $119.75 a ton c.i.f., and Italian at $124 a ton same basis. The last two varieties can be purchased in carlots.

TABLE II

Estimated Comparative Rates for Bargeload Shipments of Sheets to the South and Southwest.

For 84,000-lb carloads of sheets from the Pittsburgh district using the proposed Pittsburgh Terminal
Barge rates based on 500-ton minimum barge load, load not necessarily all sheet steel

DESTINATION	Rates in cents per 100 lb									
	Switching Chg. at Pgh.	Transfer Chg. at Pgh.	Barge Rate	Transfer at Dest.	Switching at Dest.	All-Rail Rate	Total Rail-Water Rate	All-Rail per Carload	Rail-Water per Carload	Est. Saving per Carload
Evansville	4.8	3.75	12.4	5	2.86	60	28.81	$504.00	$242.00	$262.00
Memphis	4.8	3.75	16.5	4	1.59	81	30.64	660.40	257.38	403.02
New Orleans	4.8	3.75	27.6	4	2.56	92	43.46	772.80	365.06	407.74
Mouston	4.8	3.75	37.1	5.5	1.7	94*	54.25	789.60	455.70	333.90

* Depressed freight rate due to water competition.

(From estimates compiled by Charles Donley & Associates)

oluntary Allocations Projects Take 440,000 Tons of Steel a Month

ashington

• • **Voluntary allocations** pro-
ams now call for about 440,000
ns of steel and 107,000 tons of pig
on a month. These figures were
eased here by the Office of In-
dstry Cooperation which also re-
valed that three other programs
w being processed may take an
ditional 160,000 tons of steel a
onth. Approved programs run for
8-month period beginning July
1948.

The Administration's political
mpaign for mandatory controls
ceived another mild swipe in this
port from OIC Director John C.
rden who stated that while Pub-
Law 395 (authorizing voluntary
reements) is not sufficient to
ve the inflationary problems of
untry "we believe it is desirable
attack the problem on a volun-
ry basis to the fullest extent be-
re applying mandatory regula-
ons."

Programs approved and tonnages
volved are:

teel	Tons per Month
omic Energy Commission......	20,000
eight cars and repair of rolling tock	240,000
arm air heating equipment....	29.500
litary requirements	106,000
troleum industry (Oil field tanks nd production equipment).....	16,500
nstruction and repair of barges Largely for petroleum transportation)	20,000
eel pre-fab houses	9.500
thracite coal industry equipment	2,500
Total per month	444,000
ig Iron	
using Program	107,000

The programs in process cover
e following fields:

*Coal mining facilities (bitumin-
s mines)*—This is a complicated
oject, amounting to about 400,-
0 tons of rails, plates, sheets, and
apes. Difficulty is that there are
proximately 7000 consuming par-
ipants.

Mining machinery was originally
cluded in this program, but is
w being considered as part of
overall mining machinery plan.
may involve as much as 600,000
ns of steel. Discussions with the
reau of Mines and industry rep-
sentatives are under way.

Additional Petroleum Equipment
Oil country goods, line pipe, and containers have been eliminated from this program, largely because industry is receiving capacity output at the present time. Barges are in a separate program and tank cars are part of the freight car program. Still under consideration for steel allocations are: tankers (program to be presented to steel advisory committee soon); truck tanks, consumer storage, and liquid petroleum gas.

Shipbuilding—Navy Dept. is urging a merchant ship construction program. No details available, but it appears likely that a program will be worked out.

Also in process is a voluntary allocations program for adding nonferrous metals to the strategic stockpile. The White House prodded this program into action. Conversations have been held between officials of the Office of Industry Corporation, Munitions Board, and the National Security Resources Board. The Munitions Board is currently preparing for OIC a list of needed materials indicating priority of acquisition, and specific grades and quantities recommended for acquisition before Feb. 28, 1949. As soon as this data is available industry committees will be called in by OIC

9 Million Tons Steel Needed For Building Government Believes

Washington

• • • **On the basis** of revised government estimates, at least 1.5 million tons of additional steel will be needed for construction materials this year than had previously been estimated.

This would bring total 1948 requirements for the building industry to approximately 9 million tons as against earlier estimates of 7 million plus. Requirements for 1949 will be even higher—about 9.5 million tons—on the basis of preliminary surveys.

None of the foregoing estimates make any allowance for either reduced costs or a business recession. In fact, a gradual increase in costs is allowed for.

Latest estimates have placed the expected 1948 construction volume at $18 billion. This is the combined revised estimate of the Bureau of Labor Statistics and the Commerce Dept. They had previously set the maximum figure at $15.2 billion.

In terms of dollar volume, the revised figure represents an increase

(CONTINUED ON PAGE 122)

Coming Events

Aug. 30-Sept. 3 **American Chemical Society,** national meeting, Washington.
Sept. 6-10 **American Chemical Society,** national meeting, St. Louis.
Sept. 13-17 **American Chemical Society,** national meeting, Portland, Ore.
Sept. 13-17 **Instrument Society of America,** conference and exhibit, Philadelphia.
Sept. 28-Oct. 1 **Assn. of Iron & Steel Engineers,** Convention and Iron and Steel Exposition, Cleveland.
Oct. 4-7 **American Institute of Steel Construction,** annual convention, Quebec, Canada.
Oct. 5-7 **Industrial Packaging Engineers Assn.,** Industrial Packaging and Materials Handling Exposition, Chicago.
Oct. 5-9 **Concrete Reinforcing Steel Institute,** semiannual meeting, Asheville, N. C.
Oct. 11-13 **National Lubricating Grease Institute,** annual convention, Chicago.
Oct. 11-13 American Society Tool Engineers, semi-annual meeting, Los Angeles.
Oct. 13-15 **Porcelain Enamel Institute,** annual forum, Urbana, Ill.
Oct. 18-22 National Safety Congress and Exposition, Chicago.
Oct. 22-25 **Metal Treating Institute,** annual meeting, Philadelphia.
Oct. 23-29 **American Society for Metals,** annual convention, Philadelphia.
Oct. 24-29 **American Welding Society,** annual meeting, Philadelphia.
Oct. 25-27 American Institute of Mining and Metallurgical Engineers, Metals Div., fall meeting, Philadelphia.
Oct. 25-29 **National Metal Exposition,** Philadelphia.
Oct. 27-28 **Society for Nondestructive Testing,** annual convention, Philadelphia.

Industrial Briefs . . .

• ADDS TO LINE—The Kasle Steel Corp., Detroit steel warehouse distributors, have recently added to their wide line of steel products the Koppers Plastipitch protected metal roofing and siding, and are the distributors for this item throughout the state of Michigan.

• REPRESENTATIVES—Condenser Service & Engineering Co. Inc., Hoboken, N. J., have appointed Acme Engineering & Sales Inc., New Orleans, as their representatives on all marine activities in the states of Texas, Louisiana, Mississippi and Alabama.

• CONSULTANT SERVICE—Walter C. Reed, for many years development engineer in the laboratories of the General Electric Co., Pittsfield, Mass., has recently established a consultant service for brazing operations and opened his office on North Street in Dalton, Mass.

• OPENS BRANCH — Victor Equipment Co., San Francisco, manufacturer of flame cutting apparatus and distributor of welding supplies for 38 years, has formally opened its new Chicago branch office and assembly plant at 1312 West Lake Street.

• EUROPEAN VISITOR—A. E. Whyman, directors of European operations for E. W. Bliss Co., Detroit, visited this country recently for discussions with the company president regarding Bliss plant operations in England and France.

• PURCHASES PLANT—Lovejoy Tool Co. Inc., Springfield, Vt., has announced the purchase of a new 3-story fireproof building with 33,000 sq ft of floor space, as part of their general expansion program.

• BUYS FOUNDRY—Howard Foundry Co., Chicago, has purchased a modern and efficient magnesium foundry in Belmont, Calif.

• LETS CONTRACT—The Chicago Bridge & Iron Co., Chicago, has let a contract to American Bridge Co., Pittsburgh, for a runway and shop building No. 2 at its new Salt Lake City fabricating plant.

• MOVES—Marquette Machinery Co., Detroit, has announced its removal from the Guardian Bldg. to 3800 Maple Ave., Dearborn, where it will house both its offices and warehouse.

• ELECTED—E. Armand Thomas, president, Thomas Foundries, Inc., Birmingham, has been elected temporary chairman of the newly-organized Alabama group of Gray Iron Founders' Society.

• BUYS WAREHOUSE—The U.S. Steel Supply Co. has purchased the new and modern warehouse formerly owned and operated by Columbia Steel Co., in San Francisco, and will operate it under the management of Frank B. Stewart, who was formerly associated with Columbia.

• NEW BUILDING — Ceco Steel Products Corp. expects to complete a new building of approximately 38,000 sq ft by the first of next year which will make possible the combination of fabrication and warehouse facilities of the company in San Francisco. The company is erecting its own steel.

• PLANT AUCTION—A large government war plant in Garland, Texas, not subject to national security clause restrictions and suitable for a variety of industrial uses, having 250,000 sq ft area on a 100-acre tract, will be auctioned for the War Assets Administration Aug. 20 at 2 P.M. on the premises.

• EXPANSION—New machinery and expanded facilities have enabled the A. C. Gilbert Co., New Haven, Conn. to boost its total production 30 pct over the same period last year.

Steel For Building

(Continued from Page 121)

of 35 pct over last year. Nevertheless, allowing for increased costs for materials and labor, a rise in physical volume of about 20 pct is indicated.

Several factors combine to account for the zooming construction activity. One is a rise in production of building materials, particularly in iron and steel items. For such producers, preference in steel distribution has been the rule. Frst half reports show an increase of 3 pct in output of building materials over the same period last year. This increase is exclusive of any action under the voluntary allocations program; effects of this would not be evident until much later this year.

The increase in building materials has been readily absorbed by a sharply climbing construction rate; the building industry was employing nearly 2.2 million workers as of June with the peak season yet to come. It is estimated that by September, the total work force will have reached at least 2.4 million employed. While this figure is under the peak 1942 construction year, it is 300,000 more than for last year.

An estimated 450,000 new permanent dwelling units (non-farm) were started during the first half 1948; it is estimated that an additional 500,000 will be started during the last half.

The ratio of increase for physical volume is somewhat less than for dollar volume. One reason for this apparent discrepancy is that since the first of the year builders have been devoting more attention to the higher priced single family house than to the low or medium price range.

However, an important part of the unexpected rise in residential construction is accounted for by a noticeable increase in two-family and multi-family type dwelling. Adjournment of the regular session of Congress without additional housing legislation caused the BLS to drop 12,500 dwelling units from its original forecast.

By the end of June, $7.7 billion had been spent so far this year for new construction, according to combined government estimates. Of this total, $6 billion represented private financing; 99 pct of all residential construction was built with funds for this source.

owder Metallurgy Is Topic At Scientific Meeting In Austria

raz, Austria

• • **The International** Congress r Powder Metallurgy held here om July 12 to 17 was the first vent of its kind to take place in ostwar Austria.

More than 400 delegates from 18 untries were given an enthusiasc reception in an old castle in the rovince of Styria of which Graz the capitol.

The mayor was host to the gathring as were the British, French nd American occupation authories. Several Government reprentatives from Vienna as well as e Governor of Styria were also resent.

Government officials and local thorities stressed the twofold nportance of the meeting as being gathering of scientists concerned ith the exchange of ideas in a pecial field and a symbol of the esumption of international culral relations.

The International Congress for Powder etallurgy was covered for THE IRON GE by Dr. Fred Schwarz, assistant to e president, American Electric Metal orp., New York.—Ed.

Prof. Gustav Huttig of the Techische Hochschule in Graz and Dr. ichard Kieffer, general manager f the Metallwerk Plansee in eutte, both prominent in the field f powder metallurgy, were mainly esponsible for the planning and reparation of the convention. heir task was a particularly difficult one in view of the post-war roubles from which this small ountry is still suffering. It was a uccess only because of the splendid pirit that seems to animate all of ustria.

The Technische Hochschule lent dded dignity to the event by conerring the honorary degree of octor of Technical Sciences to a umber of distinguished men in the eld of powder metallurgy.

Following are the recipients of egrees: Dr. W. D. Jones, London, uthor and scientist; Dr. Paul chwartzkopf, New York, founder f the Metallwerk Plansee and presdent of Electro Metal Corp.; Prof. . A. Hedvall, Goteborg, Sweden, ordwide authority on reactions in the solid state; Prof. A. F. Joffe, Moscow, prominent physicist; and Prof. L. Neel, Grenoble, France, who is responsible for the development of permanent magnets fabricated from fine, phosphoric powder.

There were many other prominent names in the list of participants among whom were: Prof. Y. Kauko, Helsinki, Finland; A. G. Metcalf, Cambridge, England; L. Weil, Grenoble, France; A. Vambrensky, Prague; J. D. Fast, Eindhoven, Holland; H. H. Hausner, New York; Prof. W. Seith, Muenster, Germany; K. Konopicky, Radenthein, Austria; E. Hirschfield, Prague; Dr. Bonthron, Fagersta, Sweden; and A. Smekal, Nieder-Roden.

More than 60 papers were read and discussed in two simultaneous sessions devoted to predominantly theoretical and technological problems. These papers will be published in book form in the U. S.

Although they were not able to attend because of travel restrictions between Germany and Austria, others read papers by such prominent scientists as F. Skaupy, Berlin and F. Sauerwald, Halle, Germany.

The scientific level of these papers was termed excellent. And there was general agreement that a comparatively new branch of metallurgy, with particularly far reaching ramifications, had proven its importance and vitality.

A large part of the participants took part in the concluding portion of the program by visiting the Metallwerk Plansee, one of the largest plants of its kind that is active in both research and production in virtually all branches of powder metallurgy.

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50 YEARS AGO

THE IRON AGE, *August 12, 1898*

• "The installation of a system to manufacture calcium carbide from sawdust is now in progress in New England. A perplexing problem with lumbermen has always been the disposal of sawdust. It is claimed that sawdust, when burned in a retort, will produce a practically pure carbon, and carbide manufactured from this is said to produce a larger quantity of acetylene gas than carbide produced from coke."

• **"Another shout cut in making tool steel is being attempted at Bradley, Ill. As usual, it depends on a secret chemical process. The familiar claim is put forth that scrap iron can be made into tool steel in six hours."**

• "Appointment by President McKinley of a commissioner-general to represent the U.S. at the Paris Exposition of 1900 is a reminder that little time must be lost if we are to take the part as exhibitors which our development as a manufacturing and industrial power entitles us.

• **"The new pneumatic mail tube for the transmission of mails between the New York and Brooklyn post offices which is laid across the Brooklyn Bridge, is a complete success. Time required for passage of mail packs is 2½ min."**

• "A most notable change in the iron and steel industry during the last year or two is the effort on the part of the sellers to deal direct with the consumers, thereby saving the commission or profit that would go to the middleman. A request to a mill by a dealer for a price on steel usually brings the answer that the mill does not care to quote, and if a price is named, it is a prohibitory one and the dealer can do nothing."

• **"Dr. De Laval has designed a high pressure steam boiler which is now installed at the Stockholm Exposition. In this design, the boiler and engine work together automatically to regulate combustion. Steam pressure and feeding of the boiler are independent of the variation of the steam turbine."**

Construction Steel . . . .

• • • **Fabricated steel awards** this week included the following:

1320 Tons, Portland, Ore., steel for seward-Anchorage highway, Public Roads Administration, Portland, Ore. to Bethlehem Pacific Coast Steel Corp., San Francisco.

640 Tons, Portland, Ore., steel for Seward-Anchorage highway, Public Roads Administration, Portland, to Poole, McGonigle & Dick, Portland, Ore.

400 Tons, Harrisburg, Pa. Additions to Central Iron & Steel Co. plant to Bethlehem Steel Co., Bethlehem.

355 Tons, Beverly, Mass., bituminous macadam and three steel stringer bridges through De Matteo Construction Co., Quincy, Mass. to Bethlehem Steel Co., Bethlehem.

210 Tons, Clinton Co., Pa. Dept, of Highways, Bridge, to Bethlehem Steel Co., Bethlehem.

200 Tons, Front Royal, Va. Addition to boiler house at American Viscose Co. to Virginia Bridge Co.

135 Tons, Fansdale, Pa., laboratory for Philco Corp., to Bethlehem Steel. Co.

120 Tons, Newburyport and Salisbury, Mass., steel grid floor bridge, through Frederick W. Byron, Dedham, Mass. to U.S. Steel Corp., Boston.

BUFFALO—The John W. Cowper Co., Buffalo, has been awarded contract for construction of the $2,550,000 Statler Hall, on Cornell University campus, Ithica.

• • • **Fabricated steel inquiries** this week included the following:

2300 Tons, Graham Sta., W. Va., the Phillip Sporn plant of the American Gas and Electric Corp.

1150 Tons, Elsmer, Del. Grade elimination, Delaware State Highway Dept. Bids to Sept. 15.

815 Tons, Washington Co., Bridge, Pa., Dept. of Highway. Bids Oct. 20.

140 Tons, Odair, Wash., structural steel for 230-kv switchyard, etc., Grand Coulee power plant, Bureau of Reclamation, Denver, Spec. 2357, bids to Aug. 19.

100 Tons, Hamden, Conn., span welded steel girder bridge.

• • • **Reinforcing bar awards** this week included the following:

300 Tons, Boston Municipal Stadium at Franklin Park, Dorchester, through C. J. Maney Co., Somerville, Mass. to Bethlehem Steel Co., Bethlehem.

158 Tons, Beverly, Mass., bituminous macadam and three steel stringer bridges through DeMatteo Construction Co., Quincy, Mass. to Bethlehem Steel Co., Bethlehem.

100 Tons, Gary, Ind., public school building to James Duffy Co.

• • • **Reinforcing bar inquiries** this week included the following:

1150 Tons, Los Angeles, undercrossing and overcrossing, Hollywood Parkway at Melrose and at Vermont, California Div. of Highways, Los Angeles, bids to Aug. 19.

410 Tons, Oakland, Calif., foundation construction, Second Mokelumne Aqueduct, Unit C, East Bay Municipal Utility District, Spec. 81, bids to Aug. 25.

145 Tons, Los Angeles Co., 3 bridges near Malibu junction, California Div. of Highways, Los Angeles, bids to Aug. 19.

100 Tons, Hamden, Conn. span welded steel girder bridge.

125 Tons, Provo, Utah, pipe line and structures, Salt Lake Aqueduct, Bureau of Reclamation, Provo, Spec. 2344, bids to Aug. 27.

• • • **Piling awards** this week included the following:

4500 Tons, Morgantown, W. Va., lock and dam through U.S. Engineer, bids will close Aug. 17.

• • • **Railroad car awards and inquiries** this week included the following:

Clinchfield R.R. Co. ordered 35 70-ton covered hoppers to be delivered July, 1949, by American Car and Foundry Co., New York. Chesapeake & Ohio R.R. Co. has ordered 1000 70-ton hoppers from American Car & Foundry Co. The D.L. & W. R.R. Co. has ordered 500 50-ton hoppers from American Car & Foundry Co. The Frisco Lines have ordered 1000 55-ton hopper cars from Pullman Standard Car Mfg. Co., Bessemer, Ala. The D. & H. R.R. will build 300 50-ton box cars and 200 50-ton gondolas in their own shops during the third quarter of 1949. Grand Trunk & Western R.R. has ordered 500 50-ton box cars from American Car & Foundry Co. The Nickel Plate R.R. is inquiring for 500 box cars. The Pittsburgh & W. Va. R.R. is inquiring for 600 50-ton hopper cars. The new tentative car building program by Chicago, Milwaukee & St. Paul amounts to 4080 cars broken down as follows: 2300 50-ton gondolas; 1000 50-ton box cars; 500 40-ton flat cars; 200 40-ton log flat cars; 30 70-ton low side gondolas and 50 steel cabooses.

Exports During May Lowest During Year Commerce Dept. Says

Washington

• • • **Iron and steel** exports in May totaled only 346,453 net tons—the lowest monthly tonnage this year—but shipments to Western Europe are expected to boost the outflow sharply in the near future.

The Commerce Dept. reported without comment on the May total and noted that 2,115,678 net tons of iron and steel had been shipped in the first five months of this year. But the President's Council of Economic Advisers, in its midyear report, makes this significant observation:

"The rate of steel exports during the remainder of this year, while lower than in 1947, is expected to be higher than in the first part of this year because exports to Western Europe are expected to increase more than exports to the rest of the world will be reduced, even with drastic controls."

The largest single items of export during May were tin plate and tagger's tin. Together, these items accounted for 50,600 net tons of the monthly total. Black steel sheets ran second—35,254 net tons.

The complete list of iron and steel exports as reported in tonnages by the Commerce Dept. follows:

Ingots, blooms, billets, slabs, sheet bars, 19,849; wire rods, 3,132; skelp, 1,792.

Iron bars, 246; concrete reinforcement bars, 9,306; steel bars (cold finished), 2,314; other steel bars (excluding alloy), 26,325; alloy steel bars, 5,243; welding rods (electric), 1,658.

Boiler plate, 2,911; other plate (not fab), 23,796; plates (fab punched or shaped), 2,859; iron sheets (black), 924; steel sheets (black), 35,254; galvanized sheets, 6,565; strip steel (cold rolled), 4,689; strip steel (hot rolled), 5,926; tin plate and tagger's tin, 50,600; terne plate (including long ternes), 498.

Structural shapes (plain), 25,032; structural shapes (fab), 18,968; frames and sashes, 295; sheet piling, 3,726.

Rails (60 lb per yard and over), 9,418; rails (less than 60 lb per yd), 346; rails (relaying), 1,014; splice bars and tie plates, 4,638; frogs and switches, 381; railroad spikes, 705; railroad bolts, nuts, and washers, 545; car wheels, tires and axles, 2,678.

Seamless black pipe, 1,622; seamless casing and oil line pipe, 19,408; seamless boiler tubes, 3,263; welded black pipe, 5,159; welded galvanized pipe, 3,019; welded casing and oil line pipe, 9,776; welded boiler tubes, 213; other pipe and fittings, 5,771.

Plain wire, 7,780; galvanized wire, 2,829; barbed wire, 2,033; woven wire fencing, 336; woven wire screen cloth, 358; wire rope and strand, 1,035; wire nails, 1,704; other wire and manufactures, 3,262.

Horseshoe nails, 31; tacks, 352; other nails (including staples), 872; bolts, nuts, rivets and washers (except railroad), 4,578; forgings, 1,373; horseshoes, 46.

AMERICAN IRON AND STEEL INSTITUTE

Blast Furnace Capacity and Production—Net Tons

JUNE - 1948

	Number of companies	Annual blast furnace capacity	Production							
			Pig Iron		Ferro manganese and spiegel		Total			
									Percent of capacity	
			Current month	Year to date	Current Month	Year to date	Current month	Year to date	Current month	Year to date
Distribution by Districts:										
Eastern	11	13,093,560	891,517	5,231,111	33,125	163,969	924,642	5,395,080	86.1	82.8
Pittsburgh-Youngstown	17	25,588,120	1,954,588	11,249,018	18,311	136,586	1,972,899	11,385,604	94.0	89.4
Cleveland-Detroit	6	6,495,000	481,783	2,896,361	-	-	481,783	2,896,361	90.4	89.6
Chicago	7	14,700,290	1,015,189	5,952,304	5,096	5,096	1,020,285	5,957,400	84.6	81.5
Southern	8	4,949,660	379,429	2,159,015	8,667	48,106	388,096	2,207,121	95.6	89.6
Western	3	2,612,300	202,796	1,119,978	-	-	202,796	1,119,978	94.6	86.2
Total	35	67,438,930	4,925,302	28,607,787	65,199	353,757	4,990,501	28,961,544	90.2	86.3

Scrap Drama . . .

Low Phos Low Phos—*A Scrap Story in One Act*

The SCENE *is the office of one* ILL GREEN, *a prominent scrap roker.* GREEN *is seated at his esk talking into one of his two elephones.*

REEN—Now, now, take it easy! You said you wanted low phos and I told you I'd let you have a coupla cars at $51.50 a ton.

OICE ON PHONE—But I got some from Doakes Iron & Steel, Incorporated, for $44.50 last week.

REEN—You puttin' this stuff in your openhearths? OK, I'll sell you some openhearth low phos for $44.50. Nope, I'm not cutting the price. That's a different grade. You mix it with regular openhearth steel—you can have that at the formula, you know—and you'll do fairly well.

oP—Is that No. 1 steel at $44.50?

REEN—Well, you *might* call it that. We get a little more for *genuine* No. 1—the market is really at $51.50 for *genuine* No. 1.

oP—But I thought you said . . .

REEN—Yeah, I did. No. 1 is called low phos now, you know. Of course if you want *genuine* low phos, or what you might call *low phos* low phos, I think I can latch onto a coupla cars for you next week.

oP—How much?

REEN—Oh, 56, 57 bucks—see what I can do for you on account of you being a regular customer and all that. (*He hangs up. Another phone rings—the private wire.*)

REEN—Hello. . . . Yes, Chief, No, Chief, not from our yard. We heard some of the bundles wouldn't stick to the magnet. Full of what? Yeah, I know coal is manmagnetic but so is concrete. We put our name on our bundles now, like they told us, and we've had no kicks. We're shipping a nice No. 3 bundle. What? No, same price as No. 2 bundles. Ok, Chief. (*Hangs up. Other phone rings.*)

REEN—Yep. . . . Oh, Dick. Say, I had a little trouble getting that carload of cast but its on its way now. Very nice stuff. Car number . . .

2nd VoP—Same price as last week?

GREEN—Right, $72 a ton.

2nd VoP—I don't want to be nosey, but I see by the trade papers that No. 1 cast is $66 now.

GREEN—Sure, sure, but you said you wanted good stuff. We're shipping you *genuine* No. 1 cast—it's a steal at that price. Why, we had a bad windstorm last night and one of our yards lost half its stock of No. 1 cast. Blew into the river.

2nd VoP—OK, pal, thanks, sorry to bother you.

GREEN—Not at all, and no rush about paying us—anytime within the next coupla days. (*Hangs up.*)

A secretary enters. She is very smart looking: her dress is two sizes too small for her except in length. She reaches over and lays a card on Green's desk. He gives a low involuntary whistle, then looks at the card.

GREEN—Send him in.

Enter QUINTUS McGHEE, roving editor for "Bedtime," national snooze magazine.

McGHEE—Mr. Green, to what do you attribute the national scrap shortage?

GREEN—To the fact there isn't enough of it.

McGHEE—Ah, I see. Pithy. And what is your company doing about it?

GREEN—Why, we're scraping the bottom of the barrel just to make No. 3 openhearth bundles.

McGHEE—And after that?

GREEN—After that we throw in the bottom of the barrel. Good day, sir.

(Exit McGHEE. Enter I. N. GOTTS.)

GOTTS—You wrote that your company was interested in supplying scrap for our ingot conversion deal. What's your proposition?

GREEN—We'll take an order to supply you some nice openhearth low phos at $52.50. Now I understand these ingots are for Amalgamated Motors, so why should *you* bother paying for the scrap? We'll just bill Amalgamated and ship to you. That'll save you trouble. The mere fact that Amalgamated is good for the dough and yours is a young and struggling company is irrelevant, I assure you my dear Mr. Gotts.

• In the scrap mart all is not what it seems. Definitions have changed; people are less particular about specifications. The changes defy quotation in dollars and cents. That's why most of them were made. To those who work at the business daily this playlet isn't news. It's for those who don't.—Ed.

GOTTS—That $52.50 seems a little high but as long as you say it's the going price I'll give you an order for 2000 tons a month.

(Exit GOTTS. GREEN presses a buzzer and secretary enters.)

GREEN—Take a letter . . . to Energetic Importers, Inc. Gentlemen: You offer to sell us 100,000 tons of unprepared German scrap at $36 per gross ton delivered, Baltimore, on hand and contents noted. Can you tell us (a) what kind of scrap this is, (b) whether you own it and (c) why you want 100 pct cash in advance?

Take another letter to Joe Gish at Gish Mfg. Co. Tell him that due to the depressed condition of the market we can't sell that awful stuff you're shipping us at formula prices. We'll have to cut it $1 a ton—Then take a memo to our No. 2 yard and tell them to expect some nice low phos low phos from Gish Mfg. Co. next week. (*Phone rings.*)

GREEN—Hello . . . Oh, hello fella. Sometimes I get you trade paper guys mixed up. Fine. What's on your mind? Scrap price changes? Nope, everything's quiet. Not much moving. We're sticking to the formula. Not at all, you're quite welcome. 'Bye.

Refresher Course For Machine Tool Salesmen May Become Model

Program At Cornell Stresses Refinements In Addition To Fundamentals

By TOM LLOYD
Machinery Editor

Ithaca, N. Y.

• • • **An innovation in** personnel training was attempted by the National Machine Tool Builders' and the American Machine Tool Distributors' Assn.'s at Cornell University, July 12 to 23, when a refresher course was conducted for builder and distributor salesmen. Formally titled a "Sales Refresher Course," the program attempted to bring before salesmen not only the fundamental sales weapons, but some of the refinements of proved and tried selling techniques and methods.

The results of the efforts, which were spearheaded by Tell Berna, general manager of the NMTBA, obviously are unknown, but the enthusiasm of the group would indicate that such a program presented on an annual basis would not be amiss.

The course consisted of a series of about 40 lectures and some 15 group discussions over the period of 2 weeks. The lectures were presented by both builder and distributor sales representatives, representatives of machine tool using industries, and by members of the faculty of the Industrial Engineering Dept. of Cornell University.

Phases of machine tool selling that were covered by the course included, in addition to sales fundamentals, such subjects as analysis of personalities, engineering requirements of a salesman, machine tool selection, plant layout, work simplification, man-machine charts, job tooling, sales strategy, advertising, distributor and builder sales approaches, handling and presentation of proposals, and similar subjects about which a salesman must be familiar.

The curriculum was the result of a careful study by the Sales and Service Committees of both the builders' and distributors' associations. It was planned to develop the subject from its fundamental concepts through such phases as customer relations, markets, the actual selling, servicing, and repeat orders. Particularly stressed were the phases of engineering knowledge of the salesman and service to the customer.

A background of industry knowledge was presented, in which it was pointed out that the machine tool industry, with a capacity for producing $600 million worth of machine tools annually, is operating at just about 50 pct of capacity. Prewar, according to A. G. Bryant, president of NMTBA and vice-president of Cleereman Machine Tool Co., 1929 and 1939 were the best sales years for the industry, with sales totalling about $200 million.

Export sales, which normally account for about 20 to 25 pct of the industry's output, are drastically curtailed because no machine tools are being shipped to Russia. In 1947, export sales accounted for about 26.6 pct of the output, whereas during 1948 less than 10 pct of sales are for export markets. In addition to not selling to Russia or countries within the Russian sphere of influence, there is a definite dollar shortage in other areas, restricting the buying of such equipment. It was estimated by Mr. Bryant that about $120 million worth of orders are available in non-Soviet markets, ready to be placed, but the shortage of money prohibits completion of the orders.

Commenting on the 70-group air program, Mr. Bryant stated there is no way of estimating how much this potential business amounts to. One of the major factors in this business is the fact that there is no knowledge of how to do some of the machining work anticipated. Consequently, the industry has a committee that is working directly with the Air Forces on this matter.

Representing the buyers of machine tools were several men from top ranking manufacturing companies. W. A. Sredenschek, assistant to the vice-president of purchasing at General Electric Co., spoke to the group on "How the Machine Tool Salesman looks to the Buyer." This discussion was based on a survey among purchasing agents at General Electric. The summation of the survey was that about 30 pct of the salesmen calling on the purchasing agents at GE are order takers, 30 pct of them are average salesmen, and about 40 pct are good salesmen.

Harold G. Warner, asst. master mechanic or the Cadillac Div., of General Motors Corp., described the information that a customer wants from a sales engineer. William J. Peets, chief engineer of Singer Mfg. Co., Elizabethport, N. J., discussed the same subject from the standpoint of a sewing machine manufacturer. Tooling, the knowledge of which is a requisite of a good sales engineer, was discussed by Robert Haynes, manager of the Mechanical Dept., Spicer Mfg. Co., Toledo. Adaptability and flexibility of fixtures and versatility of tooling was emphasized by Mr. Haynes by the use of specific examples in use at Spicer plants.

From the faculty of Cornell University, Prof. Harry J. Loberg was chosen as director of the course. His report on the relative importance of the machine tool industry in the industrial scheme was augmented by pertinent discussions throughout the course. "Man-Machine Charts," "Shop Layout" and "Specific Milling Machine Problems" were described by Prof. C. I. Millard of the Cornell Dept. of Industrial Engineering. Prof. K. C. White, also of the Dept. of Industrial Engineering, spoke to the group on "Work Simplification." Dr. A. L. Winsor, director of Cornell's School of Education, analyzed "Customer Personality."

The effort of the National Machine Tool Builders' Assn. and Machine Tool Distributors' Assn., marks the beginning of a new trend in both industrial training and in education. While the direct results of the effort are difficult to establish, the idea will be given close attention by other industries and by educational institutions. Purdue University had an observer at the course, Prof. O. D. Lascoe, and Kenneth Lawyer, sat through the course as an observer from Western Reserve University in Cleveland.

Britain's Steel Industry Moves Along Despite Controversy Over Nationalization

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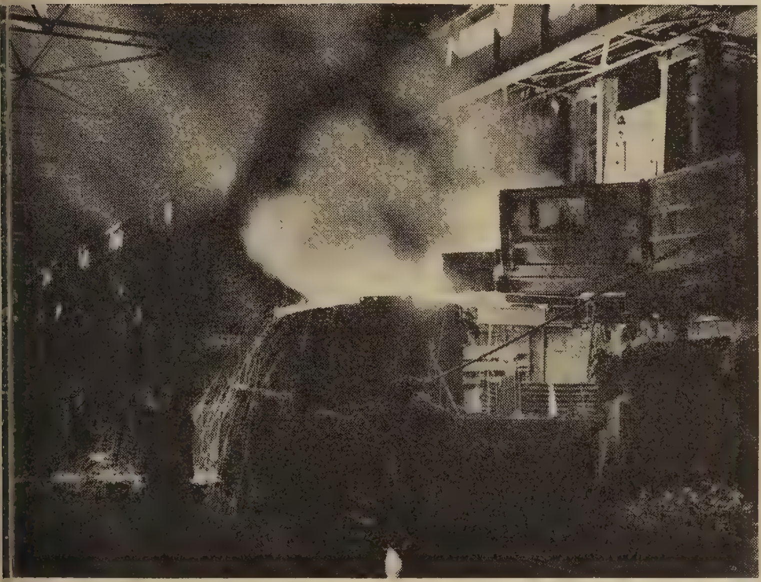
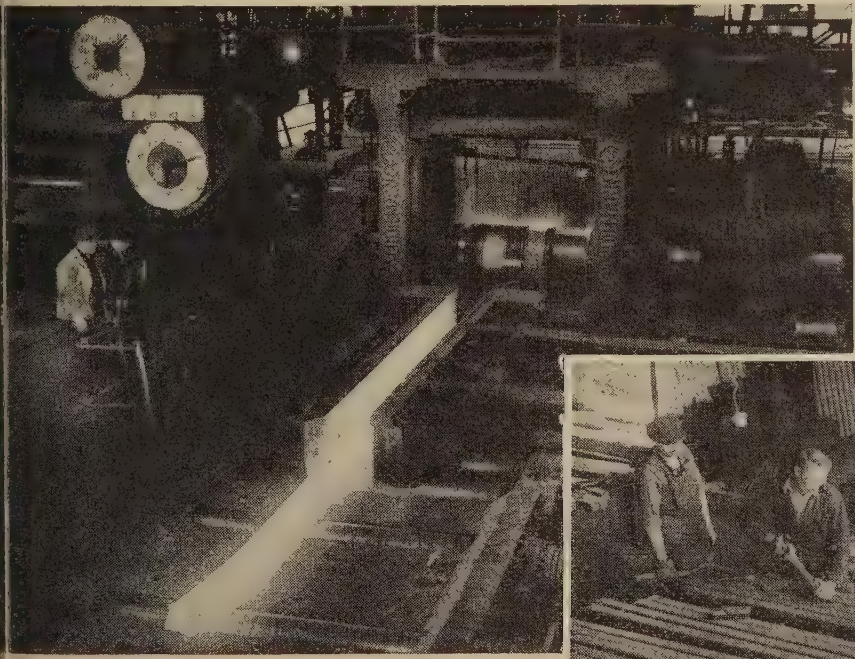


ABOVE: Tapping an openhearth furnace. Weekly output of the Albion works is about 4000 tons. Prime Minister has pledged nationalization of the industry. But industry says this isn't necessary because it has already exceeded the government production target of 15 million tons per year.

ABOVE: A general view of the Briton Ferry Steel Co.'s Albion works in South Wales. Works is equipped with oil fired openhearth furnaces. Among scrap in foreground are worn out tank tracks ready for melting. British have been able to keep their steel industry supplied only by intensive scrap drives. Like the U. S. they would like to obtain more scrap from Germany.



ABOVE: A scene in the blooming mill. Ingot has already become a bloom and is in process of being further reduced to a billet. British steel industry ranks second only to coal.

BELOW: Workmen are shown chipping billets to remove seams, scabs and other surface defects prior to shipping to consumers. Meanwhile, steel and products made of steel play an all important role in Britain's export drive which is aimed at relieving her shortage of dollars. British steel is allocated to industries according to their importance to the domestic economy and their ability to export.

U. S. Steel Request For Rail Rate Cut Points Up F.o.b. Sales Problems

Pittsburgh

• • • **Ben Fairless'** request for decreased freight rates, filed by two U. S. Steel subsidiaries, added plenty of kick to the already potent situation which has resulted from the mills' forced abandonment of basing point pricing. (THE IRON AGE, Aug. 5, p. 116.)

Industry scuttlebutt expects plenty of snow and ice to be seen before any such reduction is granted by the railroads or is allowed by the Interstate Commerce Commission. The latter agency certainly will have to get in its licks before a decrease can be granted—particularly in view of the rather unusual nature of the request in singling out two large consumption points for special rates.

The mills' request suggests that the roads can maintain their general rate structure—that the decreases are to apply only to lots of five or more cars with minimum per car weights of 80,000 lb. On such shipments the knockoff suggested was from 46 to 26¢ per 100 lb to Detroit, a 43.5 pct reduction, and from 56 to 34¢ to New York, 39 pct off.

Steel officials have a good point in emphasizing the value of their business to the Eastern railroads. The shipments are desirable—lots of it can be handled in opentops, the nature of the material results in relatively few claims, and there's lots of it. Rough figures indicate there are about 5 tons of steelmaking materials shipped for every ton produced. Actually, when all the odds and ends are figured in—from mill equipment down to bricks for relining—the figure probably is nearer 6 than 5 tons per ton of finished or semi-finished steel.

The railroads, of course, know the business is desirable and don't want to lose it. But if they should arrange a knockoff and can clear it with the ICC, everybody else will want to get into the act.

There are ICC precedents for reductions on bulk tonnages. A special ruling in December, 1939, permitting rates identical with barge hauls on blackstrap molasses from New Orleans to Peoria and Pekin, granted the Illinois Central, the Missouri Pacific and several other roads permission to give a depressed rate, amounting to 15 pct of the single car rate, for shipments of 1800 tons minimum (equivalent to 38½ tank cars) to Commercial Solvents Corp. plants. (For reference, the ruling was ICC Investigation & Suspension Docket No. 4645.) Following this precedent-setting decision, subsequent bulk shipment reductions have been allowed on alumina and bauxite movements from Mobile to Spokane.

Presumably, the Eastern roads might be able to obtain similar dispensations, although just a few weeks ago a petition involving limestone was denied. The limestone case, however, had a number of ramifications not present in the previous cases and not applicable to the steel situation.

The flow of events for steel reductions would be: (1) consideration of the proposal by the general freight committee of the eastern roads, (2) publication and filing with the ICC of new rates by any single railroad or combination of roads 30 days prior to institution, and (3) filing of complaints pertinent to the new rates by shippers or other carriers. This latter action, the filing of complaints, is all too likely in the eyes of the petitioners.

In some traffic quarters it is argued that the mills might be well advised to seek a large-tonnage shipment reduction, rather than a rate cut to specific points. Especially so, they argue, if it is for bulk material. Bulk material rate reductions would cut mills' raw material costs but would not improve Pittsburgh's competitive marketing position. It could be expected, too, that favorable action on a rate to New York City would bring pressure from other Eastern consumers for lower rates.

A similar campaign a number of years ago got to first base, but died there. Daniel Willard, then president of the Baltimore & Ohio, backed a mill proposal for a 10 pct cut in rates out of Pittsburgh, but opposition from the other roads and lack of the final push from the mills shelved the proposal.

Opinion in railroad circles would seem to indicate a rough road for this request. There will certainly be no immediate action on it, they believe, and if it ever does get over the hump, the adjustments are not likely to be as substantial as those requested.

Recommends Postponing Stockpiling of Scrap

Washington

• • • **Postponement of** "any definite decision or action on the question of stockpiling purchased scrap and/or pig iron until there is a definitely continued **drop in the iron** and steel industry below peak demand" has been recommended to the National Security Resources Board by R. J. Wysor, formerly president of Republic Steel Corp., and now serving as special assistant to NSRB Chairman Arthur M. Hill.

In a special report on strategic stockpiling of scrap, Mr. Wysor suggests that when iron and steel demand and supply are more in balance a meeting be held "between the National Security Resources Board and the industry to discuss stockpiling, ferrous exports, relationship among scrap, pig iron and iron ore, and other factors."

If a strategic stockpile of scrap is to be established, Mr. Wysor states that it should be of heavy melting home grade or purchased variety and preferably of carbon rather than alloy steel quality. He further believes that it should be located in a few strategic spots, near large centers of steel production, where adequate handling and transportation facilities are available. Logically, he states, it should be owned or controlled by the Federal Government, to be released at the time of national emergency or at such time in amounts and at prices as may be determined together with the industry.

Inasmuch as heavy melting scrap and cold pig iron are of generally similar characteristics, Mr. Wysor suggests stockpiling either or both at such times and places as stockpiling may have been agreed upon.

A warning is issued by Mr. Wysor against "a similar heyday of exporting such a vital, quick asset raw material as scrap, which occurred in the years just prior to World War II. Further, in the desirable export of iron and steel goods, emphasis should be placed on finished, rather than crude or semi-finished products, which carry an additional scrap loss out of the country."

Recommending a continuation of efforts to obtain German scrap, Mr. Wysor commends the Dept. of Commerce for its handling of this problem.

Weekly Gallup Polls . . .

Dewey Leads Presidential Race As Campaign Opens

Princeton, N. J.

• • • **The first presidential** poll since the two major party conventions shows Gov. Thomas E. Dewey, the Republican candidate, starting the campaign proper with a comfortable lead over President Truman, according to George Gallup, director, American Institute of Public Opinion.

As of the period immediately following the Republican and Democratic conventions, here is what interviewers for the institute found in questioning a cross-section of voters from coast to coast.

"If the presidential election were being held today, how would you vote—for Dewey, for Truman or for Wallace?"

	Pct
Dewey	48
Truman	37
Wallace	5
No opinion	10

While these figures indicate bright prospects for the GOP, several factors need to be taken into account to interpret the findings:

(1) President Truman has taken the lead in demanding action by the special session of Congress on prices and housing, two issues which are close to the hearts and pocketbooks of the people.

The President's ringing call for action may appeal to a sufficient number of voters, especially in the low-income groups, to increase his present following.

(2) A fairly high proportion of voters, 10 pct, indicate that they have not yet made up their minds what candidate they favor. These fence-sitters include many people who did not vote in 1944, but among those who did vote, a high proportion, three out of four, voted Democratic. This is a factor favorable to Mr. Truman, for if past experience is any guide, more of the undecided voters will return to the Democratic fold than will switch party allegiance.

Almost all of the interviewing for the current poll was completed before the end of Henry A. Wallace's Progressive Party convention, and therefore the figures do not reflect the effect which that convention with its high fervency and zeal may have had on voting sentiment.

Probably no presidential campaign in the last generation has started with so many different factors which can cause political opinion to shift during the initial weeks. Until some of the confusion has cleared away it will be difficult to tell what the exact score is.

An unknown factor is the number of states that will permit the Wallace ticket to qualify on the ballot in November. To the extent that the ticket does not qualify in major states, the Wallace percentage found in the current polling will suffer.

It is too early, also, to tell whether charges that the Wallace party is Communist-dominated will reduce the vote for Wallace, with the obvious effect of improving President Truman's chances.

Add to all these factors the uncertainty of the situation in Europe, where a new diplomatic impasse with Russia may develop at any time, and it can be seen that 1948 represents something almost unique in presidential campaigns.

President Truman's campaign managers will undoubtedly take heart from the fact that their candidate has in the past made phenomenal comebacks in popularity.

Democratic supporters of the President are undoubtedly saying that if he did it once, he can do it again.

• • • **One effect of the** fight within the Democratic party over President Truman's program has been to stimulate public interest in what the Democratic party platform has to say about controversial issues.

A survey among voters finds that a higher proportion took the trouble to read all or some of the Democratic platform than was the case with the Republican platform although neither document got a very widespread reading. The civil rights plank in the Democratic platform seems to have aroused particular attention.

But Democratic Platform Arousing More Attention Than Republican Platform

○ ○ ○

To test public interest in the Democratic platform the institute put the following question to a cross-section of voters in all parts of the country:

"Did you happen to read the Democratic party platform drawn up at their convention in Philadelphia?"

A similar poll on the Republican platform has been reported earlier. A comparison follows:

	Dem. Platform Pct	Rep. Platform Pct
Yes, all of it	7	7
Yes, only part of it	32	21
No, not any of it	61	72

Those voters who said they had paid some attention to the Democratic platform were then asked a series of questions concerning its contents, such as "Will you tell me what the platform says about civil rights? About housing? About prices?"

The results show that nearly two out of three persons who had read the platform remembered the major ideas in the civil rights plank,, which promises to work toward ending all racial or religious discrimination and pledges abolition of poll taxes, anti-lynching legislation and other civil rights reforms.

The planks on housing and on prices got somewhat less attention, with nearly half unable to remember what the platform said about housing.

It seems clear from these results that presidential campaign platforms get comparatively little attention from the mass of voters.

MACHINE TOOLS

. . . News and Market Activities

Higher Prices Seen As Several Builders Raise Prices 10 Pct

• • • **Prompted by another** round of wage increases as well as higher raw material and component costs, several major producers of machine tools raised prices about 10 pct this week which may be taken as an omen of a general price increase throughout the industry, according to trade sources.

Effect of the increase on the trade is difficult to gauge prematurely, that is, whether it will force in some new firm orders or make buyers drop out of the market for the time being and get along with what they have. In any event, the effect will probably not be clear-cut.

A possible effect may be that buyers will demand immediate delivery on machines, off the shelf in other words, in order to get the equipment to work immediately. Where there is not an immediate need for a machine, customers are likely to buy less or not buy at all, for prices are bound to come down. But for the time being, delivery may prove more important than price in some lines.

From the point of view of the machine tool industry, the increase may prove to be of substantial value in defense business, which machine tool companies are required to take, in providing a higher level on which to be renegotiated.

Very few orders having their origin in the defense program have reached major segments of the industry. Producers of milling and grinding equipment who might be expected to be effected first, have as yet reported no boom in government orders, and it is now an obvious fact that the defense program is moving very slowly.

ECA is also in the doldrums and there is some dissatisfaction being heard in industry circles over the job the foreign machine tool dealers are doing, particularly in France. This may lead to a minor exodus of company representatives to Europe this fall, where some may stay on a more or less permanent basis.

Without a return to production on a broad scale, European countries cannot become self supporting according to Alexander G. Bryant, president of the National Machine Tool Builders' Assn. and vice-president of the Cleereman Machine Tool Co., Chicago.

Mr. Bryant will spend a month in France, Great Britain, Belgium, Holland and other European Countries. He will give manufacturers there a first-hand picture of what modern American machine tools can do to aid their country's recovery.

He will be joined later in Paris by Tell Berna, general manager of the National Machine Tool Builders' Assn., Cleveland, and Milburn A. Hollengreen, chairman of NMTBA Government Relations Committee and president of the Landis Tool Co., Waynesboro, Pa.

The conferences to be held with European industrialists and ECA officials abroad are at the express request of Washington authorities that the industry take the initiative in stimulating action to increase production facilities in the cooperating countries.

"Estimates received from representatives of American machine tool builders abroad indicate that there are blocked orders which could be placed in the immediate future in the amount of approximately $125 million if credits could be established," Mr. Bryant said.

"Of immediate interest to the United States is the fact that if we can send American machine tools which are now in long supply and which can be shipped reasonably soon, they can be put to work with European labor and European materials to produce some of the things, such as farm equipment, mining machinery and trucks which are in short supply in this country and which will cause a further drain on American resources if we export them in large quantities.

* * *

In Detroit hope springs eternal that new tooling programs for automatic transmissions will pick up some of the slack in machine tool ordering that has accumulated in recent months. Last week, and for about the third time, renewed interest was reported in equipment for Chevrolet-Saginaw transmission division. Most sources believe that an automatic shifting mechanism for Chevrolet is involved although the program has thus far only progressed to the quotation stage. It has been pointed out, however, that at least a year will probably be required to reach the production levels required for a producer like Chevrolet.

At the same time, additional inquiries are coming in for the new Packard automatic transmission. Considerable tooling activity at Packard is expected in the near future.

Another bright spot on the tooling horizon is the substantial volume of orders being placed by established tool and die shops which have caught on to a substantial volume of new business since the tool and die strike settlement. Meanwhile, some of the small tool shops that were born in haste during or shortly after the war are reported to be folding under the sharp competitive conditions that are coming back rapidly.

In Cincinnati, approximately $3 million was involved in the sale of Cincinnati Planer Co. to Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., by Sidney Rose and Philip Moscowitz, who acquired the planer company in 1946. The new owners will continue the planer company's operations in Cincinnati. Ralph J. Kraut, president of Giddings & Lewis was named president of the Cincinnati Planer Co., William H. Rutz, vice president, and Russell E. Hanson, treasurer. Mr. Kraut is president of Giddings & Lewis, Mr. Rutz executive vice president and works manager, and Mr. Hanson secretary, treasurer and counsel.

In Erie, Pa., Burke Machine Tool Co., Conneaut, Ohio, has been sold by Harry Rockwell, Conneaut, to a group of Cincinnati industrialists. New owners are Harry C. Levenson, industrial engineer in charge of the plant, Louis Goldsmith, president, and Joseph Karp, secretary-treasurer.

South Bend

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SWING—over bed	16¼"
over cross slide	6⅞"
TURRET TO SPINDLE DISTANCES—	
Maximum with 6' bed	28¼"
with 7' bed	40¼"
TURRET TOOL FEED	6⅛"
CARRIAGE LONGITUDINAL TRAVEL—	
6' bed	22½"
7' bed	34½"
CROSS SLIDE TRAVEL	9¾"
SPINDLE SPEEDS—Twelve with 2-speed motor	16 to 880 r.p.m.
CARRIAGE LONGITUDINAL FEEDS—48 R.H. or L.H.	.0015" to .0841"
CROSS SLIDE FEEDS—48 in or out	.0006" to .0312"
THREAD CUTTING FEEDS—48 R.H. or L.H.	4 to 224 per inch
TURRET POWER FEEDS—96 reversible	.0001" to .0148"

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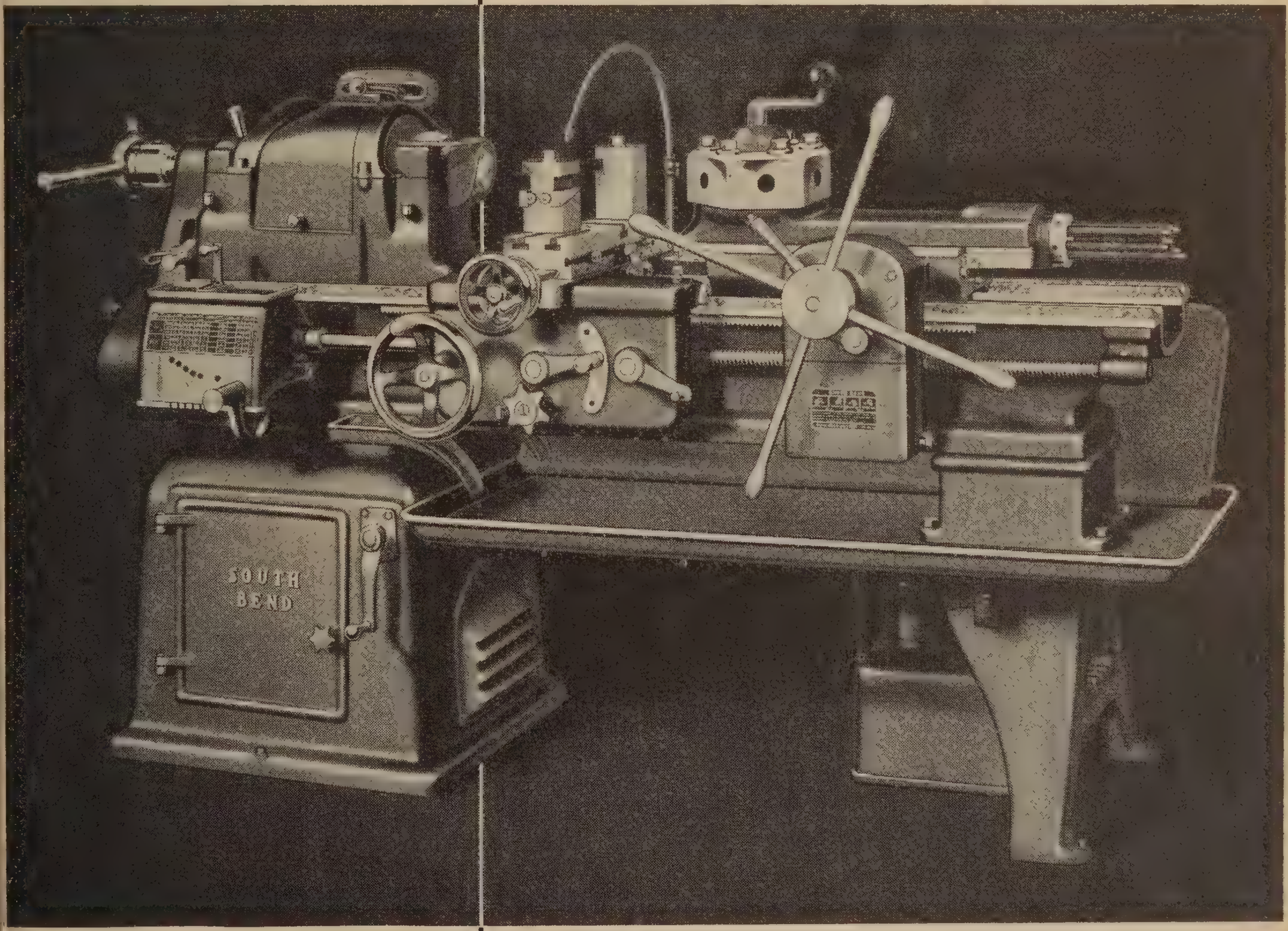

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Movements Are Slow Despite Higher Prices

New York

• • • **Additional tonnages** of scrap that appeared last week as a result of the $2.50 price increase have disappeared. The same shortage and heavy demand that existed before the price increase again prevails. Most sources are agreed by now that the new formula has not and will not in the future alleviate the present situation.

Demand for openhearth grades in Cleveland and the valley is heavy. Big consumers are desperately trying to cling to the new formula. But many of the smaller consumers are walking off with the scrap by paying over-the-market prices. Foundry grades are moving toward a new high there and some think it is doubtful if the formula can hold for any length of time.

Rumors of talk about higher prices last week have come right out in the open. Many dealers feel that prices could have gone higher—and that they may in the near future. But a number of mills and several brokers do not share their views. They think the market is at its peak.

On the open market in Pittsburgh, low phos continues to bring a premium and moved up 50¢ to $49.50 to $50. Rail specialties also advanced 50¢ and scrap rails went up $1.

Appearance of the German scrap on the open market is expected in 3 or 4 weeks. At the same time two large steel producers will be bringing some of the available German scrap to this country themselves. Several small dealers have been reported trying to take advantage of the forthcoming foreign scrap by offering large tonnages—money in advance.

•

PITTSBURGH—Movements in steelmaking have tailed off slightly over the last couple weeks following the price increase. And demand in cast grades is reported slightly weaker. The general feeling on the new formula concedes that it isn't actually bringing out or is not going to bring out any more metal. But it did release the tonnages which had been held back. Many dealers think the price could have gone higher and still expect that it may. Pricewise there was not too much activity. Free market low phos continues to bring a premium and moved up 50¢ to a $49.50 to $50 range. Rail specialties also advanced 50¢ and scrap rails went up $1. Railroad offerings for August were up slightly over July but still were not plentiful.

•

CHICAGO—Already there is much talk about higher prices. Some dealers are claiming they have orders for local mills which would deliver the openhearth scrap into the mills at $43. The market remains very strong despite heavy shipments. Recent rail lists closed higher. But in cases the roads returned to the practice of earmarking their heavy melting to the mills at the mills price. The spread in this item represents the top and bottom of consumer prices paid for this item last week. Prices on rerolling rails, No. 3 rails and cut rails, are badly confused. Going prices vary widely, particularly on cut rails 2 ft and under. The railroads did not sell at the top bid price on many items.

•

PHILADELPHIA—Shipments were low this week because of bad weather. The market was generally quiet and some sources expect it to continue that way until after Labor Day. Little additional domestic scrap seems to be making its appearance despite the price increase. Several boatloads of German scrap have arrived. First of it is expected to hit the market in about 3 weeks. In the meantime, several small dealers are reported to be trying to take advantage of the forthcoming foreign scrap situation by offering large tonnages for sale—money in advance.

•

CLEVELAND—Demand for openhearth grades here and in the valley is terrific. Big consumers are clinging to the formula while some of the smaller consumers are walking off with the scrap. Shipments are poor, but scrap is not being held. Plenty of material is being offered for higher prices and brokers are reluctant to take anything but open orders. Railroad lists brought from $46.50 to $48 for uncut scrap which has given the market new impetus this week. Foundry grades are moving toward new highs. It is doubtful whether the formula can be held in this market even in spirit and it might be well for major consumers to abandon it if for no other reason that it provides some segments of the trade with something to shoot at. Psychologically forbidden fruit is always the sweetest.

•

DETROIT—The scrap market is marking time at the moment, showing little change from a week ago. Scattered reports continue to come in from dealers that prices over the formula are being paid by some buyers. But mill purchases are at a level $2.50 over the previous price, it is reported. Scrap flow has slowed up noticeably in the last fortnight, it is indicated, and this week's closing of the Packard plant and one Briggs unit is expected to dip further into available supply. The cast market is stiffening but recent buyers of cast continue to be few in number and the tonnage is small.

•

BIRMINGHAM — Shipments of steel scrap here have shown some improvement due to the recent increase in prices. Some steel scrap is moving from the Birmingham area to northern areas. Prices of cast grades of scrap remain steady, with demand still heavy.

•

NEW YORK—No. 1 steel scrap turned a little firmer toward the end of last week and is quotable at $38.50 to $39. Several brokers are wondering if the top has been reached. For despite reports of strength elsewhere and of high prices on the recent New York Central list, several large eastern mills have withdrawn from the market. There is a definite state of uncertainty on prices here. There was a typographical error in last week's New York market prices. The correct quotation on shoveling turnings was $33.50 to $34.

•

CINCINNATI—Openhearth material is still moving to major consumers at the formula despite the variety of prices being paid. This market is showing sympathetic strength from the activity in other districts and demand for openhearth material exceeds supply by a wide margin. Foundry grades are strong and moving with shipments more important than prices in most cases. Converters are fairly active in this market, making its stability questionable at the present time.

•

BOSTON—Major consumers appear to be conforming to the new formula prices in a market that shows very little change from last week. Demand remains good. A slight pickup in demand for cast has been noted. But at the moment there is no change in price.

•

ST. LOUIS—The usual August slowdown of shipments of scrap iron to the St. Louis industrial district prevails. The recent increases in prices is not stimulating the movement. The market continues strong at unchanged prices.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.50 to $43.00
RR. hvy. melting	43.50 to 44.00
No. 2 hvy. melting	42.50 to 43.00
RR. scrap rails	57.00 to 58.00
Rails 2 ft and under	62.50 to 63.50
No. 1 comp'd bundles	42.50 to 43.00
Hand bdld. new shts	42.50 to 43.00
Hvy. axle turn.	44.00 to 44.50
Hvy. steel forge turn	44.00 to 44.50
Mach. shop turn	37.50 to 38.00
Shoveling turn.	39.50 to 40.00
Mixed bor. and turn	37.50 to 38.00
Cast iron boring	39.50 to 40.00
No. 1 cupola cast	64.50 to 65.50
Hvy. breakable cast	55.00 to 56.00
Malleable	76.00 to 77.00
RR knuck, and cup	58.00 to 59.00
RR. coil springs	58.00 to 59.00
RR. leaf springs	58.00 to 59.00
Rolled steel wheels	58.00 to 59.00
Low phos.	49.50 to 50.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy, melting	$41.50 to $42.00
No. 2 hvy. melting	41.50 to 42.00
No. 1 bundles	41.50 to 42.00
No. 2 dealers' bundles	41.50 to 42.00
Bundled mach. shop turn.	39.50 to 40.00
Galv. bundles	38.00 to 38.50
Mach. shop turn.	36.50 to 37.00
Short shov. turn.	38.50 to 39.00
Cast iron borings	38.00 to 39.00
Mix. borings & turn	36.50 to 37.00
Low phos. hvy, forge	50.00 to 52.00
Low phos. plates	48.00 to 49.00
No. 1 RR. hvy. melt	47.50 to 48.50
Rerolling rails	65.00 to 67.00
Miscellaneous rails	61.00 to 62.00
Angles & splice bars	59.00 to 60.00
Locomotive tires, cut	59.00 to 60.00
Cut bolster & side frames	54.00 to 55.00
Standard stl. car axles	71.00 to 72.00
No. 3 steel wheels	57.00 to 57.50
Couplers & knuckles	56.00 to 57.00
Rails, 2 ft and under	64.00 to 67.00
Malleable	81.00 to 83.00
No. 1 mach. cast	73.00 to 75.00
No. 1 agricul. cast	68.00 to 69.00
Heavy breakable cast	61.00 to 65.00
RR. grate bars	67.00 to 68.00
Cast iron brake shoes	59.00 to 60.00
Cast iron car wheels	62.00 to 63.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	41.00 to 42.00
No. 1 bundles	41.00 to 42.00
No. 2 bundles	41.00 to 42.00
Mach. shop turn	35.50 to 36.00
Shoveling turn.	37.50 to 38.00
Cast iron borings	35.50 to 36.00
Mixed bor. & turn	35.00 to 35.50
Low phos., plate	48.50 to 50.00
No. 1 cupola cast	66.00 to 68.00
Hvy. breakable cast	58.00 to 59.00
Rails 18 in. & under	61.50 to 62.50
Rails random length	56.00 to 58.00
Drop broken	70.00 to 71.00

BOSTON

Dealers' buying prices, per gross ton, f.o.b. Boston

No. 1 heavy, melting	$34.40
No. 2 hvy, melting	34.40
Nos. 1 and 2 bundles	34.40
Busheling	34.40
Shoveling turn.	32.40
Machine shop turn.	30.40
Mixed bor. & turn	30.40
Cl'n cast chem. bor	33.00 to 34.50
No. 1 machinery cast	59.00 to 60.00
No. 2 machinery cast	56.00 to 57.00
Heavy breakable cast	54.00 to 54.50
Stove plate	51.00 to 51.50

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	.... $38.00
No. 2 hvy. melting	.... 38.00
No. 1 bundles	.... 38.00
New busheling	.... 38.00
Flashings	.... 38.00
Mach. shop turn.	$32.50 to 33.00
Shoveling turn.	34.50 to 35.00
Cast iron borings	33.50 to 34.00
Mixed bor. & turn	34.50 to 35.00
Low phos. plate	42.50 to 43.00
No. 1 cupola cast	55.00 to 58.00
Heavy breakable cast	50.00 to 53.00
Stove plate	52.00 to 53.00
Automotive cast	55.00 to 58.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$44.50 to $45.50
No. 2 hvy. melting	41.00 to 41.50
No. 1 bundles	44.50 to 45.50
No. 2 bundles	41.00 to 41.50
Mach. shop turn.	36.50 to 37.50
Shoveling turn.	38.00 to 38.50
Mixed bor. & turn	36.50 to 37.00
Clean cast chemical bor	41.50 to 42.00
No. 1 machinery cast	65.00 to 66.00
No. 1 mixed yard cast	60.00 to 62.00
Hvy. breakable cast	62.00 to 63.00
Clean auto cast	65.00 to 66.00
Hvy. axle forge turn	46.50 to 47.50
Low phos. plate	49.00 to 50.00
Low phos. punchings	49.00 to 50.00
Low phos. bundles	47.00 to 48.00
RR. steel wheels	53.00 to 54.00
RR. coil springs	53.00 to 54.00
RR. malleable	75.00 to 78.00
Cast iron carwheels	68.00 to 70.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	40.00 to 41.00
Bundled sheets	40.00 to 41.00
Mach. shop turn.	35.00 to 36.00
Locomotive tires, uncut	50.00 to 51.00
Mis. std. sec. rails	52.00 to 54.00
Steel angle bars	54.00 to 55.00
Rails 3 ft and under	58.00 to 60.00
RR. steel springs	51.00 to 52.00
Steel car axles	56.00 to 57.00
Grate bars	59.00 to 60.00
Brake shoes	57.00 to 58.00
Malleable	72.00 to 73.00
Cast iron car wheels	61.00 to 62.00
No. 1 machinery cast	65.00 to 67.00
Hvy. breakable cast	59.00 to 60.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	.... $40.00
No. 2 hvy. melting	.... 40.00
No. 2 bundles	.... 40.00
No. 1 busheling	.... 40.00
Long turnings	27.50 to 28.50
Shoveling turnings	29.50 to 30.50
Cast iron borings	....
Bar crops and plate	44.00 to 45.00
Structural and plate	44.00 to 45.00
No. 1 cupola cast.	64.00 to 67.00
Stove plate	63.00 to 64.00
No. 1 RR. hvy, melt	.... 41.00
Steel axles	51.00 to 52.00
Scrap rails	44.00 to 45.00
Rerolling rails	51.00 to 53.00
Angles & splice bars	51.00 to 53.00
Rails 3 ft & under	52.00 to 55.00
Cast iron carwheels	50.00 to 55.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.50 to $43.00
No. 2 hvy. melting	42.50 to 43.00
Mach. shop turn.	37.50 to 38.00
Short shov. turn.	39.50 to 40.00
Cast iron borings	38.50 to 39.00
Low phos.	47.50 to 48.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy, melting	$38.50 to $39.00
No. 2 hvy. melting	.... 37.00
No. 2 bundles	.... 37.00
Mach. shop turn.	31.50 to 32.00
Mixed bor .& turn.	31.50 to 32.00
No. 1 cupola cast	57.50 to 58.50
Clean auto cast	57.50 to 58.50
Hvy. breakable cast	56.00 to 57.00
Charging box cast	56.00 to 57.00
Unstrp motor blks	55.00 to 56.00
Cl'n cast chem. bor	34.50 to 35.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$45.00 to 47.0
No. 2 heavy. melting	39.75 to 42.2
No. 1 bundles	39.75 to 42.2
No. 2 bundles	39.75 to 42.2
No. 1 busheling	39.75 to 42.2
Mach. shop turn.	34.75 to 37.7
Shoveling turn.	36.75 to 39.2
Cast iron borings	35.75 to 38.2
Mixed bor. & turn	34.75 to 37.7
No. 1 cupola cast	64.00 to 65.0
Mixed cupola cast	60.00 to 61.0
Charging box cast	56.00 to 57.0
Stove plate	60.00 to 61.0
Stove auto cast	60.00 to 61.0
RR. malleable	70.00 to 75.0
Small indi. malleable	47.00 to 49.0
Low phos, plate	47.25 to 48.0
Scrap rails	50.00 to 52.0
Rails 3 ft & under	57.00 to 58.0
RR steel wheels	51.00 to 52.00
Cast iron carwheels	51.00 to 52.00
RR. coil & leaf spgs	51.00 to 52.0
RR. knuckles & coup	51.00 to 52.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.00 to $42.50
No. 2 hvy. melting	42.00 to 42.50
No. 1 bundles	42.00 to 42.50
No. 1 busheling	42.00 to 42.50
Drop forge flashings	42.00 to 42.50
Mach. shop turn.	37.00 to 37.50
Shoveling turn.	38.00 to 38.50
Steel axle turn	42.00 to 42.50
Cast iron borings	38.00 to 38.50
Mixed bor. & turn	38.00 to 38.50
Low phos.	47.00 to 47.50
No. 1 machinery cast	73.00 to 76.00
Malleable	82.00 to 83.00
RR. cast.	76.00 to 77.00
Railroad grate bars	60.00 to 62.00
Stove plate	61.00 to 63.00
RR. hvy. melting	42.50 to 43.00
Rails 3 ft & under	64.00 to 65.00
Rails 18 in. & under	66.00 to 67.00

SAN FRANCISCO

Per gross ton f.o.b. shipping point:

No. 1 hvy, melting	.... $27.50
No. 2 hvy, melting	.... 27.50
No. 2 bales	.. 27.50
No. 3 bales	.... 24.50
Mach. shop turn.	.... 18.00
Elec. fur. 1 ft under	36.00 to 40.00
No. 1 cupola cast	50.00 to 51.00
RR. hvy, melting	.... 28.50
Rails	.... 29.00

LOS ANGELES

Per gross ton f.o.b. shipping point:

No. 1 hvy, melting	... $27.50
No. 2 hvy, melting	.... 27.50
No. 1 bales	.... 27.50
No. 2 bales	.... 27.50
No. 3 bales	.... 24.50
Mach. shop turn.	.... 18.00
No. 1 cupola cast.	45.00 to 50.00
RR. hvy, melting	.... 28.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt..	.... $26.00
Elec furn. 1 ft and under.	.... 40.00
No. 1 cupola cast	40.00 to 43.50
RR. hvy, melting	.... 26.00

HAMILTON, ONT.

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point.

Heavy melting	$22.00*
No. 1 bundles	22.00*
No. 2 bundles	21.50*
Mechanical bundles	20.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.00*
Bushelings, new fact, prop'd	21.00*
Bushelings, new fact, unprep'd	16.00*
Short steel turnings	17.00*
No. 1 cast	$42.00 to 46.00
No. 2 cast	35.00 to 37.00

*Ceiling Price.

NONFERROUS METALS

. . . News and Market Activities

Copper Prices Are Increased to 23.50¢ by Most Major Producers

New York

• • • **With one major** exception, copper producers have lost no time in joining other nonferrous metal producers in a round of price increases that has the trade buzzing. Lead by the smaller producers, all major companies with the exception of Kennecott Copper Corp. have now advanced their prices by 2¢ per lb making their price for the metal 23.50¢ per lb.

Due to the fact that Kennecott opened its September books at the old price of 21.50¢ it was necessary to quote a spread in price of the metal from 21.50 to 23.50¢ per lb. Although this mixed action left the market somewhat confused, it was believed that substantially more copper was being sold at the higher price than at the lower one.

How long this dual price situation will continue is anyone's guess. When a similar situation developed last year, a price spread was in effect for about a month. After that it settled at the lower level. Most sources in the trade feel that the reverse will be the case this time. But few buyers feel it with sufficient certainty to place large orders at the higher prices.

The initiative in raising prices was taken by several smaller companies. A few days later Phelps Dodge Corp. and Anaconda Copper Mining Co. opened their September books at the increased price of 23.50¢ per lb. They were reported to have booked substantial tonnages at that figure.

Although Kennecott booked some orders for September delivery at its 21.50¢ price, this big producer was handicapped somewhat by a deadlock in labor negotiations which has existed since the termination of its contract June 30. The company denied, however, that this situation had caused them to adhere to the lower price for their metal.

Prior to the increase the smaller producers had been reluctant to book orders at the lower price. They pointed to higher costs, including freight, materials and labor, as making the 2¢ per lb increase necessary. But these higher costs affected the larger producers too. And they are also a factor in smelting and refining.

Strong consumer demand, coupled with the government stockpiling program has kept the market firm since the war. No doubt this market firmness was also a factor in the price increase, as was the case when lead and zinc were increased by 2 and 3¢ respectively the week before.

Meanwhile several brass companies have announced increases in prices of their products reflecting the advance registered by copper. The Consolidated Mining & Smelting Co. of Canada, Ltd. also reported that copper prices in Canada had been advanced to 2¢ per lb.

The copper export market was extremely quiet. Leading sellers were quoting 23.50 fas, but getting little action.

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• • • **Following the** 2¢ per lb increase by all but one of the major copper producers prices of copper scrap were increased by about 1¼¢ per lb. Substantial tonnages of scrap were purchased at the higher level. But some dealers were reported to be holding out for still higher levels, since the increases in scrap prices were not as great as those in copper.

Cadmium Raised 15¢ per lb

New York

• • • **Cadmium producers** last week raised their quotations on the metal by 15¢ per lb. The price of the metal is now $1.90 a pound for commercial shapes and $1.95 for anodes.

Reasons given for the increase were higher production costs, although limited supplies in the face of increasing demand were seen by some as contributing to the increase. This was the first price increase recorded for the metal since March of last year, when the former price of $1.75 per lb was established.

•

Lead

New York

• • • **Lead consumers** are finding the going extremely rough. Despite the higher quotations for the metal consumers are not able to fill their requirements at the current market price. This is partly due to the strike at St. Joe properties. The alternative of importing larger tonnages of foreign lead is not attractive because foreign sellers who realize the situation have been asking premiums of about 3¢ per lb for their product. Consumers of lead in this country have not been buying foreign lead to any great extent because they cannot afford to pay the lug.

•

Zinc

New York

• • • **Despite the increase** in zinc prices the market remains tight. Higher prices have not discouraged consumers from seeking sizable tonnages. But producers just don't have enough to go around. Some consumers have been seeking foreign metal, which, after import duty, has been selling at above the domestic market price.

Nonferrous Metals Prices

	Aug. 4	Aug. 5	Aug. 6	Aug. 7	Aug. 9	Aug. 10
Copper, electro, Conn.	21.50–23.50	21.50–23.50	21.50–23.50	21.50–23.50	21.50–23.50	21.50–23.50
Copper, Lake, Conn.	23.625	23.625	23.625	23.625	23.625	23.625
Tin, Straits, New York	$1.03	$1.03	$1.03	$1.03	$1.03	$1.03
Zinc, East St. Louis	15.00	15.00	15.00	15.00	15.00	15.00
Lead, St. Louis	19.30	19.30	19.30	19.30	19.30	19.30

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, 10,000 lb, f.o.b. shipping point, freight allowed	**16.00**
Aluminum pig, f.o.b. shipping point	**15.00**
Antimony, American, Laredo, Tex.	**35.00**
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be	**$20.50**
Beryllium aluminum 5% Be, dollars per lb contained Be	**$40.00**
Cadmium, del'd	$1.90
Cobalt, 97-99% (per lb)	$1.65 to $1.72
Copper electro, Conn. Valley	21.50-23.50
Copper, lake, Conn. Valley	23.625
Gold, U. S. Treas., dollars per oz	$35.00
Indium, 99.8%, dollars per troy oz	$2.25
Iridium, dollars per try oz	$110 to $120
Lead, St. Louis	19.30
Lead, New York	19.50
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$76 to$78
Nickel, electro, f.o.b. New York	42.90
Palladium, dollars per troy oz	$24.00
Platinum, dollars per troy oz	$93 to $96
Silver, New York, cents per oz	74.625
Tin, Grade A, New York	$1.03
Zinc, East St. Louis	15.00
Zinc, New York	15.65
Zirconium copper, 20 pct Zr, per lb contained Zr	**$8.75**

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	21.00-22.00
No. 120	20.50-21.50
No. 123	20.00-21.00
80-10-10 ingot	
No. 305	27.25
No. 315	24.25
88-10-2 ingot	
No. 210	33.00
No. 215	31.00
No. 245	24.75-25.75
Yellow ingot	
No. 405	16.25-17.50
Manganese bronze	
No. 421	23.00

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys	
0.30 copper, max.	26.50–27.50
0.60 copper, max.	26.50–27.00
Piston alloys (No. 122 type)	24.25–24.75
No. 12 alum. (No. 2 grade)	23.50–24.00
108 alloy	23.50–24.25
195 alloy	23.50–24.50
13 alloy	26.00–27.00
AXS-679	24.00–24.50

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95 pct.-95½ pct.	24.50–25.50
Grade 2—92 pct–95 pct.	24.00–25.00
Grade 3—90 pct–92 pct.	23.00–24.00
Grade 4—85 pct–90 pct.	23.50–24.00

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	37⅝
Electrodeposited	32⅜
Rolled, oval, straight, delivered	**34.34**
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	33⅜
Zinc, cast, 99.99	20.50
Nickel 99 pct plus, frt. allowed	
Cast	—
Rolled, depolarized	—
Silver 999 fine	
Rolled, 100 oz lots per troy oz	67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	**44.00**
Copper sulfate, 99.5, crystals, bbls.	**12.50**
Nickel salts, single or double, 425 lb bbls. frt. allowed	——
Nickel chloride, 300 lb bbl.	——
Silver cyanide, 100 oz. lots, per oz.	**54.00**
Sodium cyanide, 96 pct domestic, 100 lb drums	**15.00**
Zinc cyanide, 100 lb drums	**35.00**
Zinc sulfate, 89 pct, granules, bbls, frt. allowed	**7.90**

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb., f.o.b. shipping point, freight allowed.)

Flat Sheet: 0.188 in., 2S, 3S, 25.7¢; 4S, 61S-O, 27.8¢; 52S, 29.9¢;24S-O, 24S-OAL, 28.8¢; 75S-O, 75S-OAL, 35.3¢. 0.081 in., 2S, 3S, 26.8¢; 4S, 61S-O, 29.2¢; 52S, 31.3¢; 24S-O, 24S-OAL, 29.9¢; 75S-O, 75S-OAL, 37.0¢. 0.032 in., 2S, 3S, 28.5¢; 4S, 61S-O, 32.5¢; 52S, 35.2¢; 24S-O, 24S-OAL, 36.9¢; 75S-O, 75S-OAL, 46.6¢.

Plate: ¼ in. and heavier; 2S, 3S, 22.8¢; 4S-F, 25.0¢; 52S, 26.1¢; 61S-O, 25.6¢; 24S-F, 24S-FAL, 26.1¢; 75S, 75S-AL, 32.9¢.

Extruded Solid Shapes: Shape factors 1 to 4; 31¢ to 59¢; 11 to 13, 31.9¢ to 69c; 23 to 25, 33.4c to 90¢; 35 to 37, 40.8¢ to $1.25; 47 to 49, 58.7¢ to $1.84.

Extruded Round Rod, Square, Hex, Octagonal Bar: ¼ in. and over, 27¢ to 38¢; ½ to ¾ in., 28¢ to 40.5¢; ⅜ to ½ in., 29c to 43c; ¼ to ⅜ in., 30¢ to 46.5¢; 3/16 to 7/32 in., 32.5¢ to 53.5¢; 9/64 to 5/32 in., 35.5¢ to 62¢.

Rolled Rod: 1.064 to 4.5 in., 2S, 3S, 33¢ to 29.5¢; Cold-finished rod, 0.375 to 3.5 in., 2S, 3S, 35.5¢ to 31¢.

Screw Machine Stock: Drawn, ⅛ to 11/32 in., 11S-T3, R317-T4, 48¢ to 34¢; cold-finished, ⅜ to 1½ in., 11S-T3, 37.5¢ to 34.5¢; ⅜ to 2 in., R317-T4, 33¢ to 30¢; rolled, 1 9/16 to 3 in., 11S-T3, 34.5¢ to 31.5¢; 2⅛ to 3⅜ in., R317-T4, 29.5¢ to 28.5¢. Base 5000 lb.

Drawn Wire: coiled, 0.051 to 0.374 in.; 2S, 35¢ to 25.5¢; 52S, 43c to 31c; 56S, 45.5c to 37¢; 17S-T4, 49¢ to 33.5¢; 61S-T4, 43.5c to 33c.; 75S-T6, 75¢ to 54¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58c-60c; 10, 59c-61c; 12, 63-65c; 14, 69c-74c; 16, 76c-81c; 18, 84c-89c 20, 96c-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Extruded Round Rod: M, diam. in., ¼ to 0.311, 58¢; ½ to ¾, 46¢; 1¼ to 1.749, 43¢; 2½ to 5, 41¢. Other alloys higher.

Extruded Square, Hex. Bar: M, size across flats, in., ¼ to 0.311, 61¢; ½ to 0.749, 48¢ 1¼ to 1.749, 44¢; 2½ to 4, 42¢. Other alloys higher.

Extruded Solid Shapes, Rectangles: M, in weight per ft, for perimeters of less than size indicated, 0.10 to 0.11 lb. per ft, per. up to 3.5 in., 55¢; 0.22 to 0.25 lb per ft, per. up to 5.9 in., 51¢; 0.50 to 0.59 lb per ft, per. up to 8.6 in., 47¢; 1.8 to 2.59 lb per ft, per. up to 19.5 in., 44¢; 4 to 6 lb per ft, per. up to 28 in., 43¢. Other alloys higher.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16 $1.14; 5/16 to ⅜, $1.02; ½ to ⅝, 76¢; 1 to 2 in., 65¢. **0.065 to 0.082, ⅜ to 7/16, 85¢; ⅝ to ¾, 62¢; 1 to 2 in., 57¢. 0.165 to 0.219, ⅝ to ¾, 54.5¢; 1 to 2 in., 58¢; 3 to 4 in., 49¢. Other alloys higher.**

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	60	47
Strip, cold-rolled	66	50
Rods and shapes		
Hot-rolled	56	45
Cold-drawn	56	45
Angles, hot-rolled	56	45
Plates	58	46
Seamless tubes	89	80
Shot and blocks		40

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb)

	Extruded Shapes	Rods	Sheets
Copper	36.78	....	37.18
Copper, hot-rolled	....	33.28	....
Copper, drawn	....	34.28	....
Low brass	38.07*	34.85	35.15
Yellow brass	36.76*	33.44	33.75
Red brass	38.55*	35.33	35.64
Naval brass	33.92	32.67	38.61
Leaded brass	....	28.30	....
Commercial bronze	39.29*	36.32	36.63
Manganese bronze	37.51	36.01	42.11
Phosphor bronze, 5 pct	57.80*	56.30	56.05
Muntz metal	....	32.22	36.66
Everdur, Herculoy, Olympic, etc.	....	40.67	41.73
Nickel silver, 10 pct	....	46.42	46.41
Architectural bronze	....	....	....

* Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Cents per pound; add 1¢ per lb for shipments of 15,000 lb or more.)

	Heavy	Turnings
Copper	21⅛	20⅜
Yellow brass	18	17⅛
Red brass	19¾	19
Commercial bronze	19¾	19
Manganese bronze	17¾	16⅞
Leaded brass rod ends	17¾	

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery.)

No. 1 copper wire	20.25-20.50
No. 2 copper wire	19.25
Light copper	18.25
Refinery brass	18.00-18.25*

* Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer.

No. 1 copper, wire	19.25
No. 2 copper, wire	18.25
Light copper	17.25
No. 1 composition	16.50
No. 1 comp. turnings	16.25
Rolled brass	12.75
Brass pipe	12.50
Radiators	13.75
Heavy yellow brass	12.00

Aluminum

Mixed old cast	11.50
Mixed old clips	11.50
Mixed turnings, dry	11.00
Pots and pans	12.00
Low copper	12.50

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Copper and Brass

No. 1 heavy copper and wire.	18 —18¼
No. 2 heavy copper and wire.	17 —17¼
Light copper	15 —15¼
Auto radiators (unsweated)	11¼—11¾
No. 1 composition	13¾—14
No. 1 composition turnings	13¼—13½
Clean red car boxes	10¼—10½
Cocks and faucets	10¼—10½
Mixed heavy yellow brass	8¾— 9¼
Old rolled brass	10¼—10½
Brass pipe	10¾—11
New soft brass clippings	13¼—14
Brass rod ends	11 —11½
No. 1 brass rod turnings	10¼—10¾

Aluminum

Alum. pistons and struts	**8½— 9**
Aluminum crankcases	**11 —11½**
2S aluminum clippings	**12½—13**
Old sheet & utensils	**11 —11½**
Dry borings and turnings	**5½— 6**
Misc. cast aluminum	**11 —11½**
Dural clips (24S)	**11 —11½**

Zinc

New zinc clippings	10 —10½
Old zinc	7¾— 8¼
Zinc routings	**4 — 4½**
Old die cast scrap	**4½— 5**

Nickel and Monel

Pure nickel clippings	19 —20
Clean nickel turnings	15 —16
Nickel anodes	18 —19
Nickel rod ends	19 —20
New Monel clippings	14 —15
Clean Monel turnings	10 —11
Old sheet Monel	12 —12½
Old Monel castings	10 —11
Inconel clippings	10 —11
Nickel silver clippings, mixed	8 — 8½
Nickel silver turnings, mixed	6½— 7

Lead

Soft scrap lead	17 —17½
Battery plates (dry)	11 —11½

Magnesium Alloys

Segregated solids	**8 — 9**
Castings	**4½— 5½**

Miscellaneous

Block tin	**81 —83**
No. 1 pewter	**65 —67**
No. 1 auto babbitt	51 —53
Mixed common babbitt	14¾—15¼
Solder joints	19¾—20¼
Siphon tops	50 —52
Small foundry type	20 —20½
Monotype	19 —19½
Lino. and stereotype	18 —18½
Electrotype	16½—17
New type shell cuttings	15 —15½
Hand picked type shells	6½— 7
Lino and stereo dross	9½—10
Electro dress	6½— 7

Comparison of Prices . .

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

	Aug. 10, 1948	Aug. 3, 1948	July 13, 1948	Aug. 12, 1947
Flat-Rolled Steel: (cents per pound)				
Hot-rolled sheets	3.26	3.26	2.775	2.80
Cold-rolled sheets	4.00	4.00	3.495	3.55
Galvanized sheets (10 ga)	4.40	4.40	3.913	3.95
Hot-rolled strip	3.265	3.265	2.775	2.80
Cold-rolled strip	4.00	4.00	3.535	3.55
Plates	3.425	3.425	2.93	2.95
Plates wrought iron	7.85	7.85	7.25	6.85
Stain's C-R strip (No. 302)	**33.25**	30.50	30.50	30.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes	$6.80	$6.80	$6.70	$5.75
Tinplate, electro (0.50 lb)	6.00	6.00	5.90	5.05
Special coated mfg. ternes	5.90	5.90	5.80	4.90
Bars and Shapes: (cents per pound)				
Merchant bars	3.37	3.37	2.875	2.90
Cold-finished bars	3.995	3.995	3.483	3.55
Alloy bars	3.75	3.75	3.213	3.30
Structural shapes	3.25	3.25	2.767	2.80
Stainless bars (No. 302)	**28.25**	26.00	26.00	26.00
Wrought iron bars	9.50	9.50	8.65	7.15
Wire: (cents per pound)				
Bright wire	4.344	4.344	3.608	3.55
Rails: (dollars per 100 lb)				
Heavy rails	$3.20	$3.20	$2.725	$2.75
Light rails	3.55	3.55	3.05	3.10
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$52.00	$52.00	$45.00	$45.00†
Slabs, rerolling	52.00	52.00	45.00	45.00†
Forging billets	61.00	61.00	54.00	55.00†
Alloy blooms, billets, slabs	63.00	63.00	66.00†	66.00†
Wire Rods and Skelp: (cents per pound)				
Wire rods	3.619	3.619	3.133	2.80
Skelp	3.25	3.25	2.888	2.60

† Gross ton

	Aug. 10, 1948	Aug. 3, 1948	July 13, 1948	Aug. 12, 1947
Pig Iron: (per gross ton)				
No. 2, foundry, Phila.	$46.76	$46.76	$44.74	$41.22
No. 2, Valley furnace	43.50	43.50	43.50	36.50
No. 2, Southern Cinti.	48.14	48.14	45.47	38.25
No. 2, Birmingham	43.38	43.38	39.38	33.38
No. 2, foundry, Chicago†	43.00	43.00	43.00	36.00
Basic del'd Philadelphia	46.25	46.25	44.24	40.72
Basic, Valley furnace	43.00	43.00	43.00	36.00
Malleable, Chicago†	43.50	43.50	43.50	36.50
Malleable, Valley	43.50	43.50	43.50	36.50
Charcoal, Chicago	65.55	65.55	65.55	49.49
Ferromanganese‡	145.00	145.00	145.00	135.00

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† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

	Aug. 10, 1948	Aug. 3, 1948	July 13, 1948	Aug. 12, 1947
Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$42.75	$42.75	$40.25	$41.50
Heavy mlt'g steel, Phila.	45.00	45.00	42.50	39.50
Heavy melt'g steel, Ch'go	41.75	41.75	40.25	40.25
No. 1, hy, comp, sh't, Det.	38.00	38.00	36.25	37.50
Low phos. Young'n	47.75	47.75	45.25	43.50
No. 1, cast, Pittsburgh	65.00	65.00	63.75	41.50
No. 1, cast, Philadelphia	65.50	65.50	67.00	48.50
No. 1, cast, Chicago	74.00	74.00	70.00	51.25
Coke, Connellsville: (per net ton at oven)				
Furnace coke prompt	$13.50	$13.50	$13.75	$12.00
Foundry coke, prompt	17.00	17.00	16.50	13.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro. Conn.	**23.215**	21.50	21.50	21.50
Copper, Lake Conn.	**23.625**	21.625	21.625	21.625
Tin, Grade A, New York	$1.03	$1.03	$1.03	80.00
Zinc, East St. Louis	15.00	15.00	12.00	10.50
Lead, St. Louis	19.30	19.30	17.30	14.80
Aluminum, virgin	16.00	16.00	16.00	15.00
Nickel, electrolytic	42.90	42.90	36.56	37.67
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	35.00	35.00	35.00	33.00

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled

	FINISHED STEEL (Base Price)	PIG IRON	SCRAP STEEL
Aug. 10, 1948	3.74937¢ per lb.	$44.11 per gross ton	$43.16 per gross ton
One week ago	3.74937¢* per lb.	$43.94 per gross ton	$43.16 per gross ton
One month ago	3.24473¢ per lb.	$41.84 per gross ton	$41.00 per gross ton
One year ago	3.19141¢ per lb.	$36.52 per gross ton	$40.42 per gross ton

* Revised.

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1948	3.75012¢ July 27	3.22566¢ Jan. 1	$44.11 Aug. 10	$39.58 Jan. 6	$43.16 July 27	$39.75 Mar. 9
1947	3.19541¢ Oct. 7	2.87118¢ Jan. 7	37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. producing points in cents per pound unless otherwise indicated. Extras apply. (1) Commercial quality sheet grade; prices, 0.25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 20¢ per base box. (6) 18 gage and heavier. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb and over. (9) Carload lot in manufacturing trade. (10) Hollowware enameling, gages 29 to 31 only. (11) Produced to dimensional tolerances in AISI Manual Sec. 6. (12) Slab prices subject to negotiation in most cases. (13 San Francisco only. (14) Los Angeles only. (15) San Francisco and Los Angeles only. (16) Seattle only. (17) Seattle and Los Angeles only.

PRODUCTS	Prices at producing points apply to the sizes and grades produced in these areas.													
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		Seatte, S. Fr'isco, Los Angeles	Detroit	Johnstown
INGOTS Carbon forging	$50.00													
Alloy	$51.00						(per net ton)							
BILLETS, BLOOMS, SLABS Carbon, rerolling[12]	$52.00				$52.00	$52.00	(per net ton)							$52.00
Carbon forging billets	$61.00	$61.00	$61.00	61.00	$61.00	$61.00	(per net ton)							$61.00
Alloy	$63.00	$63.00				63.00	(Bethlehem, Canton, Massillon = $63.00) (per net ton)							
PIPE SKELP	3.25						3.25				Warren =3.25			
WIRE RODS	3.40 to 4.15	3.40 to 3.90		3.40	3.40		3.65	3.40			Worcester 3.70	4.05[13] 4.10[14]		3.40
SHEETS Hot-rolled[6]	3.25 to 3.30	3.25	3.25	3.25-3.30	3.25	3.25	3.25	3.25		Warren, Ashland =3.25		3.85[15] 4.15[14]	3.45	
Cold-rolled[1]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.20	4.00	Warren =4.00		4.20	
Galvanized (10 gage)	4.40	4.40	4.40		4.40			4.40		4.40	Ashland =4.40	5.15[16]		
Enameling (12 gage)	4.40	4.40	4.40	4.40			4.40		4.60	4.40			4.70	
Long ternes[2] (10 gage)	4.80		4.80							4.80				
STRIP Hot-rolled[3]	3.25 to 3.30	3.25 to 3.30	3.25	3.25 to 3.30	3.25	3.25	3.25	3.25		3.25	Warren =3.25	4.00 to 4.40[15]	3.45	
Cold-rolled[4]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00		New Haven, Warren = 4.00			4.20 to 4.50	
TINPLATE Cokes, 1.50 lb,[5] base box	6.80	6.80	6.80		6.90			6.90	6.90	(Warren, Ohio = $6.80)				
Electrolytic 0.25, 0.50, 0.75 lb, box	Deduct $1.00, 80¢ and 60¢ respectively from 1.50 lb coke base box price													
TERNES, MFG., special coated	Deduct 90¢ from 1.50 lb coke base box price.													
BLACKPLATE, CANMAKING 55-70 lb, 75-95 lb, 100-128 lb	Deduct $1.60, $1.70 and $1.60 respectively from 1.50 lb coke base box price.													
BLACKPLATE, h.e., 29 ga.[10]	4.75	4.75	4.75					4.85						
BARS Carbon Steel	3.35 to 3.55	3.35	3.35	3.35	3.35	3.35	3.35	3.35		3.35	Canton = 3.35	4.05 to 4.10		3.35
Reinforcing (billet)[7]	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35			Canton = 3.35	4.05 to 4.10		3.35
Cold-finished[8]	3.95 to 4.00	4.00	4.00	4.00			4.00					4.00[14]	4.30	
Alloy, hot-rolled	3.75	3.75	3.75			3.75	3.75	Bethlehem, Canton, Massillon = 3.75				4.75[14] to 4.80[11]		3.75
Alloy, cold-drawn								Massillon= 4.65						
PLATE Carbon steel[11]	3.40 to 3.60	3.40	3.40	3.40	3.40	3.45	3.40	Coatesville = 3.75, Claymont = 3.95 Geneva, Utah = 3.40				4.30[17]	3.65	3.45
Floor plates	4.55	4.55		4.55										
Alloy	4.40	4.40							Coatesville = 5.10					
SHAPES, Structural	3.25	3.25	3.25		3.25	3.30	Bethlehem = 3.30, Geneva, Utah = 3.25					3.85 to 4.30		3.[illegible]0
MANUFACTURERS' WIRE[9] Bright	4.15 to 4.50	4.15 to 4.65		4.15	4.15		4.50	4.25	Duluth, Worcester = 4.15			5.10		4.15
Spring (high carbon)	5.20	5.20		5.20				5.30	Worcester = 5.50 New Haven, Trenton = 5.50			Duluth= 5.20		5.20
PILING, Steel sheet	4.05	4.05				4.05								

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. producing point

Product	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Billets, forging	25.25—25.75	24.75—26.50	19.25—27.50	19.25—21.75	23.00	28.00—30.25
Bars, hot-rolled	29.25—30.00	28.50—28.00	22.50—23.00	23.00—23.50	27.00	33.00—32.50
Bars, cold-finished	29.25—30.00	28.50—28.00	22.50—23.00	23.00—23.50	27.00	33.00—32.50
Plates	34.75—34.00	32.50—32.00	25.75—26.00	26.50	30.75	36.25—35.50
Shapes, structural	29.25—30.00	28.50—28.00	22.50—23.00	23.00—23.50	27.00	33.00—32.50
Sheets	43.00—39.50	40.75—37.50	32.00—33.00	34.75—35.50	39.00	43.50—50.00
Strip, hot-rolled	28.00—27.75	25.75	20.25—21.25	21.00—21.75	28.50	41.75—45.00
Strip, cold-rolled	35.75—35.00	33.50—33.00	26.50—27.00	27.00—27.50	38.50	62.25—60.00
Wire, cold-drawn	29.25	28.50	22.50	23.00	27.00	33.00
Wire, flat, cold-rolled	35.75	33.25	26.25	26.75	38.25	62.00
Rod, hot-rolled	29.75	28.50	22.00	22.50	26.75	31.75
Tubing, seamless	79.25	79.25	....	75.25	....	....

ELECTRODES

Cents per lb, f.o.b. plant, threaded electrodes with nipples, unboxed

Diameter in in.	Length in in.	
Graphite		
17, 18, 20	60, 72	14.00¢
8 to 16	48, 60, 72	14.50¢
7	48, 60	15.75¢
6	48, 60	17.00¢
4, 5	40	17.50¢
3	40	18.50¢
2½	24, 30	19.00¢
2	24, 30	21.00¢
Carbon		
40	100, 110	6.75¢
35	65, 110	6.75¢
30	65, 84, 110	6.75¢
24	72 to 104	6.75¢
17 to 20	84, 90	6.75¢
14	60, 72	7.25¢
10, 12	60	7.50¢
8	60	7.75¢

TOOL STEEL

F.o.b. mill

W	Cr.	V	Mo	Co	Base per lb
18	4	1	—	—	90.5¢
18	4	1	—	5	$1.42
18	4	2	—	—	$1.025
1.5	4	1.5	8	—	65¢
6	4	2	6	—	69.5¢
High-carbon-chromium					52¢
Oil harden manganese					29¢
Special carbon					26.5¢
Extra carbon					22¢
Regular carbon					19¢

Warehouse prices on and east of Mississippi are 2½¢ per lb higher. West of Mississippi, 4½¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. mill

	Cents per lb
Armature	5.45
Electrical	5.95 to 6.15
Motor	6.90 to 7.20
Dynamo	7.50 to 7.90
Transformer 72	8.05 to 8.90
Transformer 65	8.60 to 9.60
Transformer 58	9.30 to 10.30
Transformer 52	10.10

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, 100 lb and heavier, No. 1 O.H., per 100 lb	$3.20
Joint bars, 100 lb	4.25
Light rails (from billets) per 100 lb	3.55

	Base per lb
Cut spikes	5.35¢
Screw spikes	
Tie plate, steel	4.05¢
Tie plates, Pittsburg, Calif.*	4.20¢
Track bolts	7.50¢
Track bolts, heat treated, to railroads	

*Seattle, add 30¢.

C-R SPRING STEEL

Base per pound f.o.b. mill

0.26 to 0.40 carbon	4.00¢
0.41 to 0.60 carbon	5.50¢
0.61 to 0.80 carbon	6.10¢
0.81 to 1.05 carbon	8.05¢
1.06 to 1.35 carbon	10.35¢

Worcester, add 0.30¢

CLAD STEEL

Base princes, cents per pound

	Plate	Sheet
Stainless-clad No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	*24.00	*22.00
Nickel-clad 10 pct f.o.b. Coatesville, Pa.	21.50	
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	
Monel-clad 10 pct, f.o.b. Coatesville	24.00	
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. mill

	Base Column	*Pittsburg, Calif.*
Standard & coated nails*	103	123
Galvanized nails*	103	123
Woven wire fence†	109	132
Fence posts, carloads††	114	...
Single loop bale ties	106	130
Galvanized barbed wire**	123	143
Twisted barbless wire	123	...

* Pgh., Chi., Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. ** On 80 rod spools, in carloads. †† Duluth only.

	Base per 100 lb	*Pittsburg, Calif.*
Annealed fence wire‡	$4.80	$5.75
Annealed, galv. fencing‡	5.25	6.20
Cut nails, carloads‡	6.75	....

‡ Add 30¢ at Worcester; 10¢ at Sparrows Pt. (less 20¢ to jobbers).

HIGH STRENGTH, LOW ALLOY STEELS

mill prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	Hi Steel	Mayari R	Otiscoloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	5.20	5.20	5.20	5.30	5.20	5.20	5.20	5.20	5.65
Sheets									
Hot-rolled	4.95	4.95	4.95	5.25	4.95	4.95	4.95	4.95	5.25
Cold-rolled	6.05	6.05	6.05	...	6.05	6.05	6.05	6.05	6.35
Galvanized	.	6.75		....	....	6.75	....	....	....
Strip									
Hot-rolled	4.95	4.95	4.95	....	4.95	4.95	4.95	4 95	5.25
Cold-rolled	....	....	6.05	....	....	6.05	6.05		6.35
Shapes	....	4.95	....	....	4.95	4.95	4.95		....
Beams	....	4.95	....	....		....	....	....	....
Bars									
Hot-rolled	5.10	5.10	5.10	....	5.10	5.10	5.10		5.40
Bar shapes	....	5.10	....	....	5.10	5.10	5.10		

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts, f.o.b. mills,
steel buttweld and seamless.
Base price, $200.00 per net ton.

Standard, threaded and coupled

Steel, buttweld	*Black*	*Galv.*
¾-in	46	29½
1-in.	48½	32½
1¼-in.	49	33
1½-in.	[illegible]	[illegible]
2-in.	50	34
2½ and 3-in.	50½	34½
Wrought Iron, buttweld		
½-in.	+20½	+46
¾-in	+10½	+35
1 and 1¼-in	+ 4½	+26
2-in.	— 1½	+22½
2-in.	— 2	+22
Steel, lapweld		
2-in.	39½	23
2½ and 3-in.	43½	27
3½ to 6-in.	45½	29
Steel, seamless		
2-in.	38½	22
2½ adn 3-in.	41½	25
3½ to 6-in.	43½	27
Wrought Iron, lapweld		
2-in.	+ 7½	+30
2½ to 3½-in.	+ 5	+25½
4-in.	list	+19½
4½ to 8-in.	+ 2	+21

Extra Strong, plain ends

Steel, buttweld		
½-in.	41	25
¾-in.	45	29
1-in.	47	32
1¼-in.	47½	32½
1½-in.	48	33
2-in.	48½	33½
2½ and 3-in.	49	34
Wrought Iron, buttweld		
½-in	+16	+40
¾-in.	+ 9½	+33
1 to 2 in.	— 1½	+22
Steel, lapweld		
2-in.	38½	23
2½ and 3-in.	43½	28
3½ to 6-in.	45½	29
Steel, seamless		
2-in.	37½	22
2½ and 3-in.	41½	26
3½ and 6-in.	45	29½
Wrought Iron, lapweld		
2-in.	+ 4½	+26½
2½ to 4-in.	— 5	+15
4½ to 6-in.	— 1	+19½

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Prices per 100 ft. at mill in carload lots, cut length 4 to 24 ft. inclusive.

OD	Gage	Seamless		Electric Weld	
in in.	BWG	H.R.	C.R.	H.R.	C.D.
2	13	19.18	22.56	18.60	21.89
2½	12	25.79	30.33	25.02	29.41
3	12	28.68	33.76	27.82	32.74
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78

CAST IRON WATER PIPE

	Per net ton
6 to 24-in., del'd Chicago	$106.70
6 to 24-in., del'd N. Y.	103.50 to 108.40
6 to 24-in., Birmingham	93.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less	120.30

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. mill Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Percent Off List
½ in. & smaller x 6 in. & shorter	35
9/16 & ⅝ in. x 6 in. & shorter	37
¾ in. & larger x 6 in. & shorter	34
All diam, longer than 6 in.	30
Lag, all diam over 6 in. longer	35
Lag, all diam x 6 in & shorter	37
Plow bolts	47

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	35
9/16 to 1 in. inclusive	34
1⅛ to 1½ in. inclusive	32
1⅝ in. and larger	27

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	**USS**	**SAE**
7/16 in. and smaller	..	41
½ in. and smaller	38	..
½ in. through 1 in.	..	39
9/16 in. through 1 in.	37	..
1⅛ in. through 1½ in.	35	37
1⅝ in. and larger	28	..

In full case lots, 15 pct additional discount.

Stove Bolts

Packages, nuts separate	61.75
In bulk	70.00

Large Rivets

	(½ in. and larger) *Base per 100 lb*
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$6.75
F.o.b. Lebanon, Pa.	

Small Rivets

	(7/16 in. and smaller) *Percent Off List*
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	48

Cap and Set Screws

(In packages)	*Percent Off List*
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	46
¾ to 1 in. x 6 in., SAE (1035), heat treated	35
Set screws, oval points	
Milled studs	19
Flat head cap screws, listed sizes	5
Fillister head cap, listed sizes	28

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$35.00
65% but less than 70%	34.00
60% but less than 65%	33.00
Less than 60%	32.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$6.60
Old range, nonbessemer	6.45
Mesabi, bessemer	6.35
Mesabi, nonbessemer	6.20
High phosphorus	6.20

Increases or decreases in freight rates, dock handling charges and taxes after Apr. 1, 1948, are to be added to above prices.

METAL POWDER

Per pound, f.o.b. shipping point, in ton lots for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	7.9¢ to 9.0
Domestic sponge iron, 98+% Fe	9.5¢ to 16.0
Eectrolytic iron, annealed, 99.5+% Fe	19.5¢ to 39.5
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe.	44.0
Hydrogen reduced iron, minus 300 mesh, 98+% Fe	63.0¢ to 80.0
Carbonyl iron, minus 300 mesh, 98%, 99.8+% Fe	90.0¢ to $1.7
Aluminum	23.0
Antimony	46.0
Brass	24.0¢ to 28.5
Copper, electrolytic	30.625
Copper, reduced	30.5
Cadmium	$2.4
Chromium, electrolytic, 99% min.	$3.5
Lead	24.0
Manganese	50.0
Molybdenum, 99%	$2.6
Nickel, unannealed	51.5
Nickel, spherical, minus 30 mesh	53.0
Silicon	29.0
Solder powder	8.5¢ plus metal cos
Stainless steel, 302	75.0¢
Tin	$1.11
Tungsten, 98%, 99%	$2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$12.50 to $14.50
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	$16.00 to $18.00
Foundry, Byproduct	
Chicago, del'd	$23.90
Chicago, f.o.b.	20.85
Detroit, f.o.b.	19.40
New England, del'd	22.75
Seaboard, N. J., f.o.b.	21.50
Philadelphia, f.o.b.	19.55
Swedeland, Pa., f.o.b.	20.50
Ashland, Ohio, f.o.b.	18.25
Painesville, Ohio, f.o.b.	20.90
Erie, del'd	19.95
Cleveland, del'd	22.45
Cincinnati, del'd	21.40
St. Louis, del'd	20.98
Birmingham, del'd	17.86

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	*Carloads, Per* 1000
First quality, Pa., Md., Ky., Mo. (except Salina, Pa., add $5)	$80.00
No. 1 Ohio	74.00
Sec. quality, Pa., Md., Ky., Mo.	74.00
No. 2 Ohio	66.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	11.50

Silica Brick	
Mt. Union, Pa., Ensley, Ala.	$80.00
Childs, Pa.	84.00
Hays, Pa.	85.00
Chicago District	89.00
Western, Utah and Calif.	95.00
Super Duty, Hays, Pa., Athens, Tex.	85.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	$13.75 to 14.00
Silica cement, net ton, bulk, Hays, Pa.	16.00
Silica cement, net ton, bulk, Ensley, Ala.	15.0
Silica cement, net ton, bulk, Chicago District	$14.75 to 15.00
Silica cement, net ton, bulk, Utah and Calif.	21.0

Chrome Brick	*Per Net To*
Standard chemically bonded, Balt., Chester	$69.0

Magnesite Brick	
Standard, Balt., and Chester	$91.0
Chemically bonded, Balt. and Chester	80.0

Grain Magnesite

	Std. ⅜-in. grains
Domestic, f.o.b. Balt. and Chester, in bulk, fines removed	$56.5
Domestic, f.o.b. Chewelah, Wash., in bulk with fines	$30.50 to 31.0
in sacks with fines	35.00 to 35.5

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, pet net ton, bulk. Midwest, add 10¢; Missouri Valley, add 20¢	$11.8

WAREHOUSE PRICES

Base prices, f.o.b. warehouse, per 100 lb.
(Metropolitan area delivery, add 15¢ to base, except New York, add 20¢)

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$5.35	$6.31	$7.47	$5.35-5.66	....	$5.37-5.50	$5.09	$5.35-5.42	$6.16	$9.14	$9.29	$10.54	$10.69
New York	5.40-5.53	6.28-6.43[1]	7.48-7.54	5.58-5.88	....	5.78	5.32-5.58	5.53-5.63	6.18-6.38	9.17-9.53	9.32-9.68	10.40-10.77	10.55-10.72
Boston	5.49-5.64	6.39	7.59-7.69	5.54-5.89	6.79	5.74	5.39-5.54	5.54-5.59	6.24-6.34	9.40-9.44	9.55-9.59	10.85-10.94	10.92-11.09
Baltimore	5.28	6.18	7.15-7.38	5.34	....	5.53	5.33	5.39	6.13	....	....	.....	.....
Chicago	4.85	5.75	6.95	4.85	6.15	5.10	4.90	4.90	5.70	9.00	9.15	10.40	10.55
Milwaukee	5.02	5.92	7.12	5.02	6.32	5.22	5.07	5.07	5.87	9.15	9.32	10.57	10.72
Cleveland	4.98-5.20	5.75-6.04[1]	7.24	5.02-5.65	6.70	5 35-5.54	5.16-5.19	5.15-5.34	5.70-5.95	9.14-9.29	9.44-9.79	10.54	10.69 .....
Buffalo	4.90-5.10	5.85	7.60-7.70	5.55-5.56	....	5.46	5.10	5.15-5.20	5.90-6.05	9.35	9.50	10.75	10.90
Detroit	5.20-5.25	6.15-6.20	7.45	5.25-5.45	6.25-6.55	5 50-5.55	5.30-5.37	5.30-5.52	6.02-6.07	9.32-9.55	9.20-9.47	10.72-10.95	10.87-11.10
Cincinnati	5.14-5.36[8]	5.82-6.21[8]	6.97	5.25-5.62[8]	....	5.50-5.71[8]	5.30-5.47[8]	5.30-5.62[8]	6.06-6.17[8]	9.35	9.50	10.75	10.90
St. Louis	5.19	6.04	7.29	5.19	6.49	5.39-5.44	5.24	5.24	6.04	9.34	9.49	10.74	11.89
Pittsburgh	4.35-4.90	5.75[1]	6.95	5.00-5.10	5.95	5.05-5.25	4.90-5.15	4.90-5.10	5.65-5.80	9.00	9.15	10.40	10.55
St. Paul	5.41	6.31	7.30-7.61	5.41	....	5.66	5.46	5.46	6.26	9.56	9.71	10.96	11.11
Birmingham	5.05[11]	6.36	6.45	5.05[11]	6.36	5.25[11]	5.00[11]	5.00[11]	6.51	....	....	.....	.....
Los Angeles	6.30-6.40	7.85-[1] 7.90	7.95 8.55	6.60-6.66	....	5.95-6.10	5.75-5.90	6.05	7.85-[14] 7.95	10.35[15]	10.20[15]	11.75[15]	11.95[15]
San Francisco	5.95[3]	7.15	7.65	6.40[8]	....	6.30	5.90	5.90	7.55	10.35[15]	10.20[15]	11.75[16]	11.95[15]
Salt Lake City	7.05	....	8.45	7.35	...	6.40	6.80	7.25	7.55	....	....	.....	.....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 to 19999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

PRODUCING POINT PRICES

Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	44.00	44.50	45.00	45.50	.....
Birmingham	42.88	43.38	.....	.....	.....
			.....	.....	.....
Buffalo	44.00-46.00*	44.00-46.00*	44.50-46.50*	.....	.....
Chicago	42.50	43.00	43.50	44.00	.....
Cleveland	43.00	43.50	43.50	44.00	.....
Duluth	43.00	43.50	44.00	44.50	.....
Erie	42.50	43.00	43.50	44.00	.....
Everett	.....	48.75	49.25	.....	.....
Granite City	45.25	45.75	46.25	.....	.....
Neville Island	46.00	46.50	46.50	.....	.....
Provo	43.00	43.50	.....	.....	.....
Sharpsville	43.00	43 50	43.50	44.00	.....
Steelton	44.00	44.50	45.00	45.50	50.00
Struthers, Ohio	42.50	.....	.....	.....	.....
Swedeland	45.00	45.50	46.00	46.50	.....
Toledo	42.50	43.00	43.50	44.00	.....
Troy, N. Y.	.....	.....	.....	.....	50.00
Youngstown	43.00	43.50	43.50	44.00	.....

DELIVERED PRICES† (BASE GRADES)

Consuming Point	Producing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	.....	48.75	49.25	.....	.....
Boston	Steelton	6.27	50.27	50.77	51.27	51.77	56.27
Brooklyn	Bethlehem	3.90	47.90	48.40	48.90	49.40	.....
Cincinnati	Birmingham	6.09	48.97	49.47	.....	.....	.....
		.....			.....	.....	.....
Jersey City	Bethlehem	2.39	46.39	46.89	47.39	47.89	.....
Los Angeles	Provo	6.93	49.93-	50.43	.....	.....	.....
Mansfield	Cleveland-Toledo	3.03	46.03	46.53	46.53	47.03	.....
Philadelphia	Bethlehem	2.21	46.21	46.71	47.21	47.71	.....
Philadelphia	Swedeland	1.31	46.31	46.81	47.31	47.61	.....
Philadelphia	Steelton	2.81	46.81	47.31	47.81	48.31	52.81
San Francisco	Provo	6.93	49.93	50.43	.....	.....	.....
Seattle	Provo	6.93	49.93	50.43	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	46.00	46.50	47.00	.....	.....

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* Republic Steel Corp. price: Basis: pig iron at Buffalo set by average price of No. 1 hvy. mlt. steel scrap at Buffalo as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

Producing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct. C/L per g.t., f.o.b. Jackson, Ohio —$56.50; f.o.b. Buffalo—$57.75. Add $1.25 per ton for each additional 0.50 pct Si. up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $58.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, $65.55. High phosphorus charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Phila., New York.

Baltimore, Phila., New York	$145
F.o.b. Birmingham	$150
F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont.	$145
Carload lots (bulk)	$145
F.o.b. Rockwood, Tenn.	$150
Less ton lots (packed)	$189
F.o.b. Etna, Pa.	$148

$1.80 for each 1% above 82% Mn; penalty, $1.80 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	8.70	8.95	9.50
Ton lots	10.30	10.90	12.80
Less ton lots	11.20	11.80	13.70

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$51.00	$52.00
F.o.b. Pittsburgh	55.00	56.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	32
L.c.l. lots	34

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.07% max. C. 0.06% P, 90% Mn.	23.00	24.85	26.05
0.10% max. C.	22.50	24.35	25.55
0.15% max. C.	22.00	23.85	25.05
0.30% max. C.	21.50	23.35	24.55
0.50% max. C.	21.00	22.85	24.05
0.75% max. C., 7.00% max. Si.	18.00	19.85	21.05

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload bulk	7.80
Ton lots	9.45
Briquet, contract, basis, carlots, bulk freight allowed, per lb of briquet	8.75
Ton lots	10.35
Less ton lots	11.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct., f.o.b. Keokuk, Iowa, openhearth $78.00, foundry, $79.00; $78.75 f.o.b. Niagara Falls; $77.50 f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe.	16.90	17.50	18.10
97% Si, 1% Fe.	17.30	17.90	18.50

Silicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si, 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	5.25	5.50	5.70
Ton lots	6.85	7.45	7.75
Less ton lots	7.75	8.35	8.65

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	16.50	....	....
50% Si	9.30	9.80	10.00
75% Si	11.80	12.10	12.85
85% Si	13.30	13.60	14.35
90% Si	15.00	15.30	16.00

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.85	$2.70	$3.40
Less ton lots	2.20	3.05	4.20

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, Contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	26.50	26.90	27.00
0.10% C	26.00	26.40	26.50
0.15% C	25.50	25.90	26.00
0.20% C	25.25	25.65	25.75
0.50% C	25.00	25.40	25.50
1.00% C	24.50	24.90	25.00
2.00% C	24.25	24.65	24.75
65-69% Cr, 4-9% C	18.60	19.00	19.15
62-66% Cr. 4-6% C. 6-9% Si.	19.45	19.85	20.00

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	12.50	12.75	12.85
Ton lots	14.00	14.90	15.50
Less ton lots	14.90	15.80	16.40

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	19.70	20.10	20.25
Ton lots	21.85	23.15	23.95
Less ton lots	23.35	24.65	25.45

..Low carbon type: 62-66% Cr, 4-6% Si, 4-6% mn, 1.25% max. C.

	Eastern	Central	Western
Carload	25.00	25.40	25.50
Ton lots	27.30	27.95	29.15
Less ton lots	29.10	29.75	30.95

Chromium Metal

Contract prices, cents per lb, chromium contained carload packed, f.o.b. shipping point freight allowed, 97% min. Cr. 1% max. Fe.

	Eastern	Central	Western
0.20% max. C.	97.00	98.50	99.75
0.50% max. C.	93.00	94.50	95.75
9.00% min. C.	91.50	93.00	94.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe Cr 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	16.25	16.75	18.80
Ton lots	19.35	20.10	22.25
Less ton lots	20.85	21.60	23.75

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	17.50	18.00	20.05
Ton lots	19.80	20.65	22.40
Less ton lots	20.80	21.65	23.40

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	18.00	19.10	21.05
Less ton lots	19.25	20.35	22.30

V Foundry Alloys

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn. V-7: 28-32% Cr, 15-21% Si, 14-16% Mn.

Ton lots	14.60¢
Less ton lots	15.85¢

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed. Si 56%, Ti 9%, Ca 5%.

Ton lots	17.90¢
Less ton lots	19.40¢

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	15.75	16.85	18.80
Less ton lots	17.00	18.10	20.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained W, 5 ton lots, freight allowed	$2.25
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)	3.10
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound Contained V_2O_5	$1.20
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb	
Ton lots	$2.50
Less ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo.	95¢
Calcium molybdate, 45-50%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo.	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo.	80¢
Molybdenum oxide in bags, f.o.b. Langeloth and Washington, Pa., per pound contained Mo.	80¢
Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$152.50
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton	$65.00
10 tons to less carload	$75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	18.40¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy.	
Carload, bulk	6.00¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	7.20¢
Ton lots	7.70¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	10.50
Ton lots	11.25

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Ton lot	$1.20	$1.21	$1.23

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots.	2.01	2.023	2.055

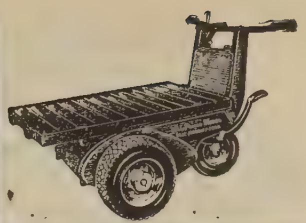
Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

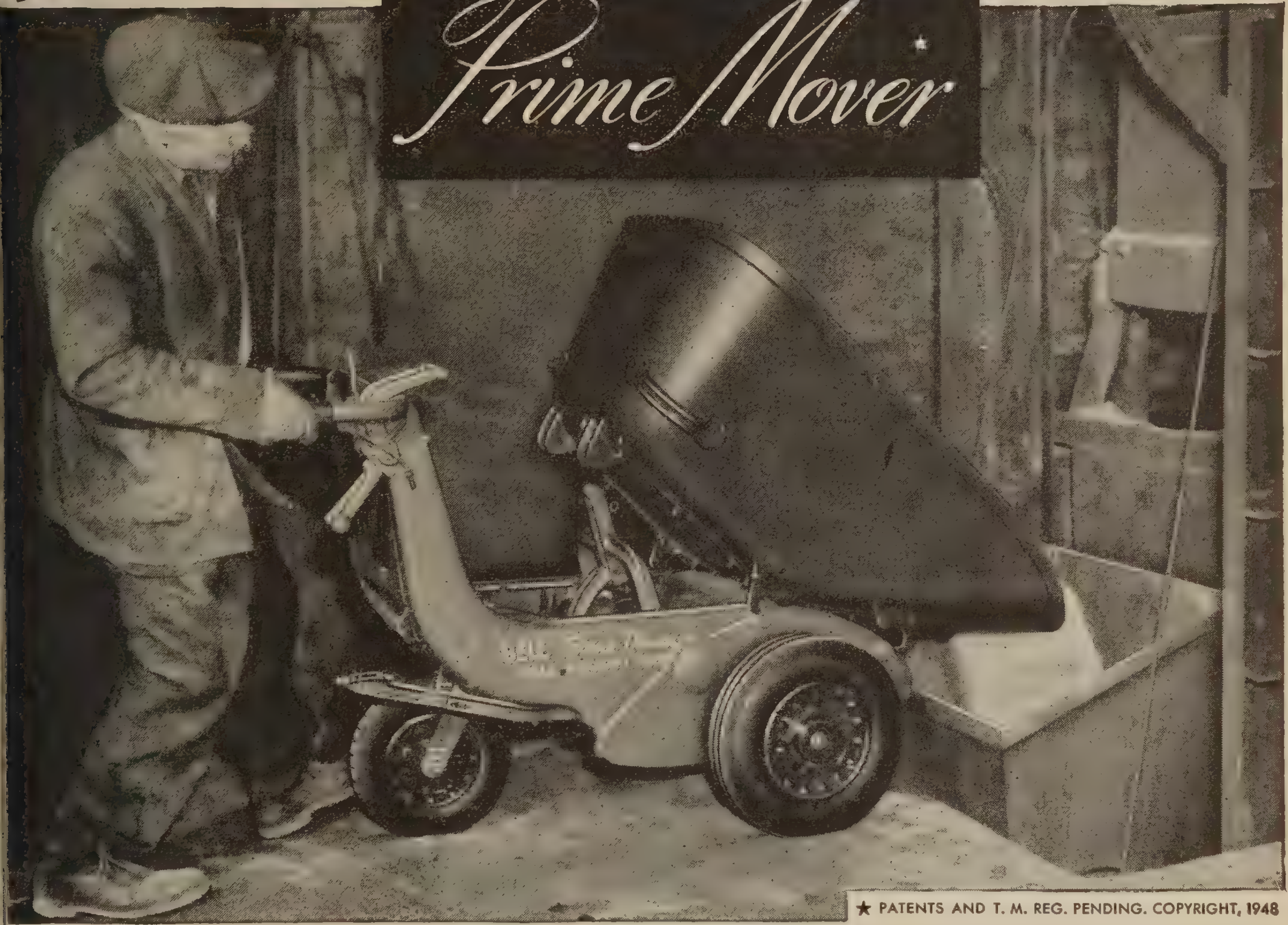
Less ton lots	$1.80	$1.81	$1.84

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.	
Carload lots	39.00¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.	
No. 1	93¢
No. 6	63¢
No. 79	45¢
Bortam, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢
Carbortam, f.o.b. Suspension Bridge, N. Y., freight allowed, Ti 15-18%, B 1.00-1.50%, Si 2.5-3.0%, Al 1.0-2.0%.	
Ton lots, per pound	8.625¢
Borosil, f.o.b. Philo, Ohio, freight allowed, B 3%-4%, Si 40%-45%, per lb contained B	$6.25

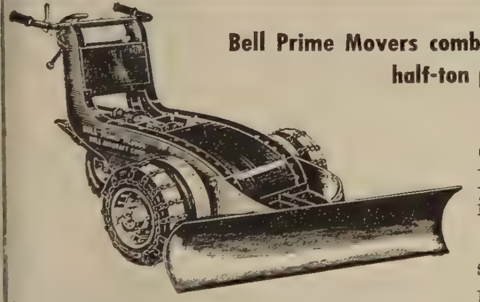
It saves up to $36 daily

The BELL Prime Mover★





★ PATENTS AND T. M. REG. PENDING. COPYRIGHT, 1948



Bell Prime Movers combine the functions of giant wheelbarrows, half-ton platform trucks, and baby bulldozers . . . enable one man to do the work of four.

● Here are just a few examples of how Bell Prime Movers pay for themselves in a remarkably short time . . .

A Pittsburgh steel manufacturer shows daily savings of 3 to 4 man-days per machine removing residue from blast-furnace cleaning; pouring concrete foundations; charging open hearths.

A stainless-steel foundry reports monthly savings of $220 on one job alone; another foundry eliminated overtime payments on its six-man shake-out crew; still another is saving 12 man-days per week on movements of sand and pig iron.

Many contractors report savings of $36 and more per machine each day on concrete pouring, "mucking," clean up work. They acclaim Prime Movers for work on upper floors, for climbing steep ramps, for taking abuse.

We have hundreds of case histories covering almost every type of business. We'll gladly provide you with these additional facts as well as the names of nearby distributors who sell and service the Prime Mover.

A Few Features

- bucket holds 10 cubic feet . . . 18 with sideboards
- 50-inch scraper blade
- 9-square-foot platform body
- gear driven . . . no belts or chains
- clutch, engine, transmission fully enclosed . . . run in oil

A PRODUCT OF
BELL *Aircraft*
CORPORATION

MAIL
COUPON
TODAY

BELL AIRCRAFT CORPORATION,
Post Office Box 1-IA8, Buffalo 5, New York

Please send me additional facts about the Bell Prime Mover.

Name.................................. *Address*........................ ..

Company.. ....

City, Zone, and State..

Something NEW in Furnace Container Design
MP CORP.
Bottom View showing Rollers
Looking into Basket

TRAY AND BASKET

in One Unit

This new furnace container design consists of basket and tray in one unit provided with rollers to ride on rails through furnace.

Made of MICHIANA long heat-hour heat-resistant lloys, these combination units facilitate loading, handling of parts to be heat-treated, and expedite movement through the furnace.

Long heat-hour service of *MICHIANA* Heat-Resistant Alloys mean lower costs and fewer delays. Specialized experience of 30 years is available to you.

MICHIANA PRODUCTS CORPORATION
Michigan City,
Indiana

MICHIANA
Heat-Resistant and
STAINLESS STEEL
ALLOY CASTINGS

O.I.T. Sets Iron and Steel Export Quotas For 3rd Quarter '48

Washington

• • • **Export quotas** for iron and steel products have been set for the third quarter of 1948, by the Office of International Trade, Dept. of Commerce.

The total third-quarter quota for those iron and steel products for which specific quantitative limitations have been established is 1,120,000 net tons—an increase of 67,000 net tons over the second quarter quota for these same products.

The following table lists the total third-quarter export quota for each product or product group.

Products	Third Quarter 1948 Quota (In short tons)
Pig iron	Closed
Iron and steel scrap	Closed
Steel ingots, blooms, billets, slabs, sheet bars, and tin-plate bars (Armco iron, ingot iron, and other iron made in steelmaking furnaces included):	
Containing no alloy:	
Steel ingots	13000
Steel billets, blooms, and slabs	55000
Steel sheet bars, and tin plate bars	2000
Alloy steel (stainless included):	
Steel ingots	500
Steel billets, blooms, and slabs	15000
Steel bars, cold-finished, including nonalloy and alloy, except stainless	20000
Concrete reinforcing bars	55000
Iron bars	110000 1
Other steel bars and rods (hot-rolled), containing no alloy	
Other Steel bars and rods (hot-rolled), alloy steel, except stainless	20430
Wire rods, except specialty steel	11330
Boiler plate	107000
Other plates, except fabricated (hot and cold-rolled included) containing no alloy	
Other plates, except fabricated (hot and cold-rolled included) alloy steel, except stainless	4000
Skelp iron and steel	500
Iron sheets, galvanized	18500
Steel Sheets, galvanized	
Steel sheets, black, ungalvanized (hot and cold-rolled included) containing no alloy	89000
Iron sheets, black	
Steel sheets, black ungalvanized (hot and cold-rolled included) alloy except stainless	14000
Steel ingots, blooms, billets, slabs, sheet bars, and tinplate bars (Armco iron, ingot iron, and other iron made in steelmaking furnaces included):	
Iron and steel strip, cold-rolled, containing no alloy	30000
Iron and steel hoop, band and scroll, cold-rolled, containing no alloy	
Iron and steel strip, hot-rolled, containing no alloy	
Iron and steel hoop, band, and scroll, hot-rolled, containing no alloy	
Terneplate, including long ternes	1000
Structural shapes, except fabricated	64000
Structural shapes, fabricated except prefabricated houses	55000
Plates, fabricated, punched or shaped	7500
Sheet piling	8000
Rails, under 60 lb per yard	7500
Relaying rails	14000

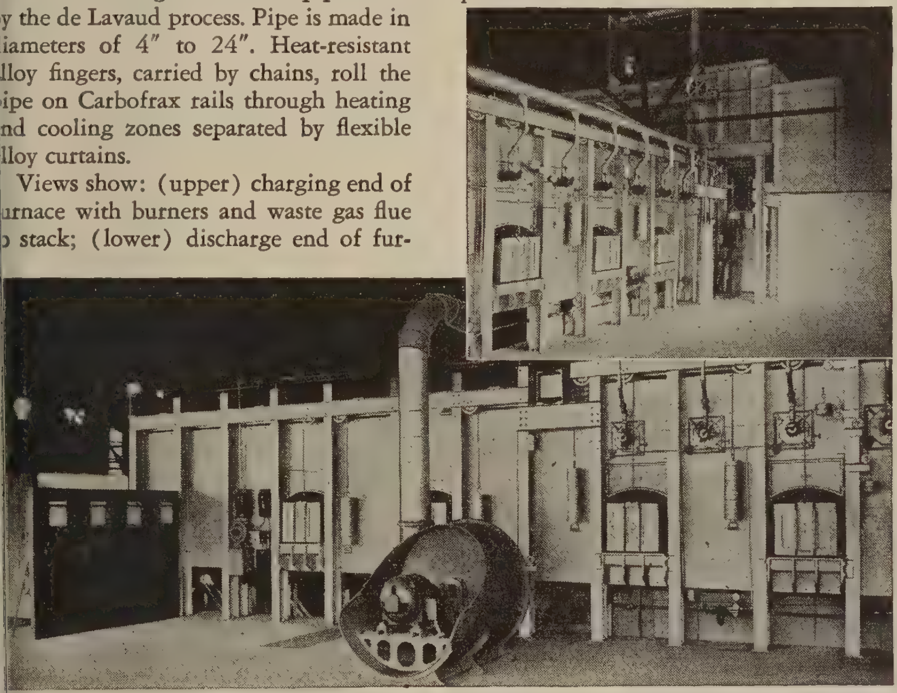
R-S FURNACE FACTS

ISSUED MONTHLY BY R-S PRODUCTS CORPORATION, PHILADELPHIA 44, PA., FOR THOSE CONCERNED WITH QUALITY HEATING OF METALS

Big Lynchburg Plant Now Using R-S Furnace for Annealing Pipe

Glamorgan Pipe & Foundry Co. in Lynchburg Virginia uses the R-S unit illustrated for the annealing of cast iron pipe made by the de Lavaud process. Pipe is made in diameters of 4″ to 24″. Heat-resistant alloy fingers, carried by chains, roll the pipe on Carbofrax rails through heating and cooling zones separated by flexible alloy curtains.

Views show: (upper) charging end of furnace with burners and waste gas flue to stack; (lower) discharge end of furnace with combustion air blower, access doors, and automatic temperature control panels at left



"Let me think," said a sage of South Bend
As he pondered the steel-making trend,
"While profits are high
Is a good time to buy
An R-S: it pays off in the end."

From the very first an R-S Furnace pays off in high production. In the end it pays off in low maintenance cost.

Did you ever stop to think what a Furnace costs? X dollars to buy. Plus Z dollars for Maintenance and downtime. Total: X plus Z dollars.

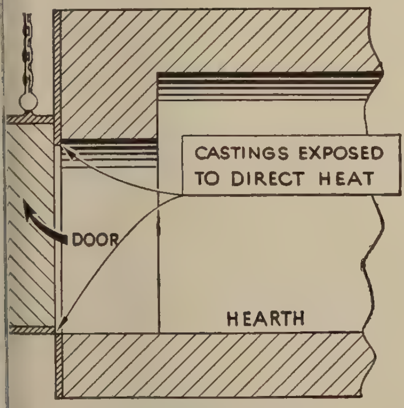
The R-S plan is to build the furnace so that the Z-dollars are reduced or eliminated. Every bolt and piece of steel, every casting, every brick, is the object of study to design it and build it so it will help to chisel that Z-dollar figure down to the vanishing point. Many R-S Furnaces run for years without a penny of upkeep; all of them run at extreme low cost.

JMLco P-BB1

Ingenious R-S Design Saves Heat and Wear

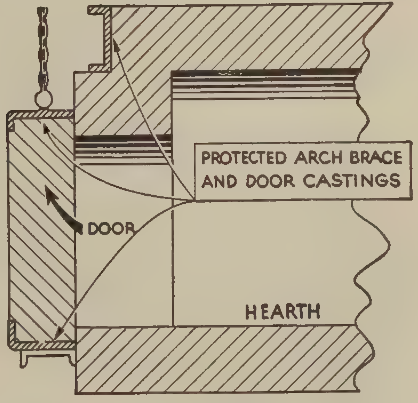
Conventional and R-S designs of door and arch brace castings are contrasted in the elevations shown. The usual type of design is shown in the sketch at left. Note that breast castings, both top and bottom, are exposed to the direct heat of the furnace and therefore act to transfer heat to door castings and adjacent buckstays.

R-S design, shown in the sketch at right, dispenses with the superfluous breast castings, and isolates the arch brace casting. Furnace heat reaches no cast parts, and is not transferred to door frame or other metal fittings, thus preventing transfer of furnace heat to the outside of the furnace.



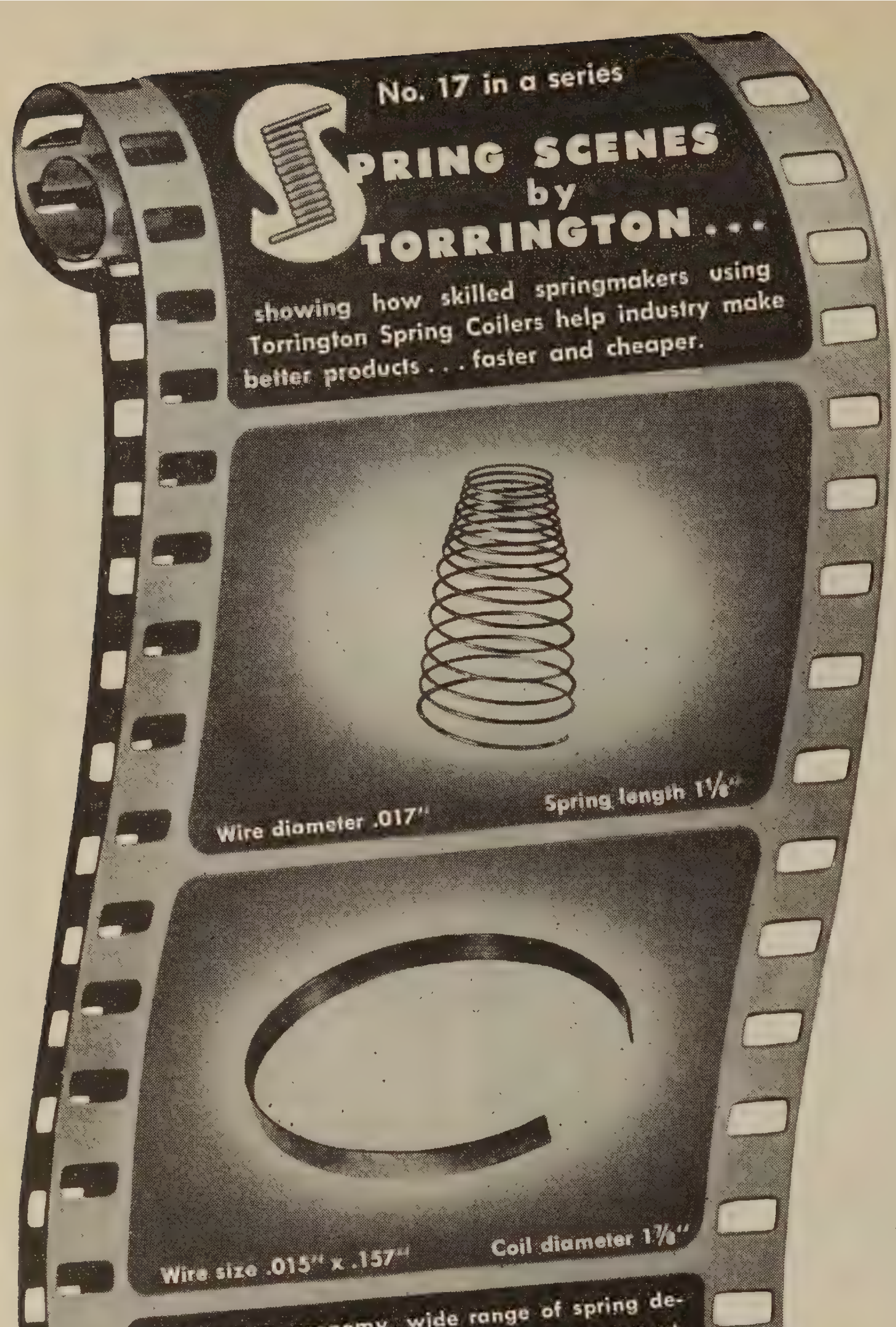
USUAL

Exposure of outside castings to interior furnace heat obviously results in loss of heat, increased cost of operation, and greater difficulty in temperature control, especially in the first zone.



R-S

Protection of outside castings from interior furnace heat conserves power, reduces cost of operation; improves temperature control, quality of product, and working conditions near furnace.



No. 17 in a series

SPRING SCENES
by
TORRINGTON...

showing how skilled springmakers using Torrington Spring Coilers help industry make better products . . . faster and cheaper.

Wire diameter .017"

Spring length 1⅛"

Wire size .015" x .157"

Coil diameter 1⅞"

Accuracy, economy, wide range of spring design—you get all three of these important features with Torrington Spring Coilers. By adjusting simple, accessible controls, the professional springmaker can quickly set up to coil practically any useful spring. Springs above were made accurately and at high speed on Model W-11. Thirteen other models with various attachments are available. Wire diameters range from .003" to .750". Write for catalog.

THE TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT

Products	Third Quarter 1948 Quota (In short tons)
Railjoints, splice bars, fish plates and tie plates	21500
Boiler tubes, iron and steel:	
Seamless	12500
Welded	
Malleable iron screwed pipe fittings, 150-lb pressure and under	5300
Floor drains, cast iron; and the following iron and steel pipe fittings when 150 lb pressure and under: couplings; galvanized pipe fittings; malleable iron pipe fittings; pipe joints grey iron, extension; pipe nipples, lapwelded, black; pipe plugs; pipe unions; screw elbows; swage nipples	
Cast-iron pressure pipe	9000
Cast-iron pressure pipe fittings	
Welded black pipe, wrought iron	2000
Welded galvanized pipe, wrought iron	
Welded galvanized pipe, steel	13000
Iron and steel pipe, n.e.s.	16000
Iron and steel wire, uncoated	19400
Galvanized wire	18500
Barbed wire	13500
Woven-wire fencing	4300
Wire cable and rope, except insulated	6900
Baling wire, black, annealed coils, cold-finished; musical instrument wire; piano wire; spring wire, bright steel, for musical instruments	2200
Wire nails	6000
Nails, asbestos shingle; cut; roofing, lead-headed; shingles; siding zinc coated; smooth, flat head, cement coated	
Castings and forgings, iron and steel:	
Railway car wheels, except locomotive	6700[2]
Railway car axles, without wheels, except locomotive	
Railway car axles, fitted with wheels, except locomotive	
Iron and steel forgings, n.e.s. (except car wheels, tires, and axles, and horseshoes and mule shoes):	
Containing no alloy	
Alloy steel (stainless included)	7700
Unlined storage tanks	27500
Rails, 60 lb or over per yd	70000
Seamless casting and oil line pipe	60000
Welded casing and oil line pipe	45000
Seamless black pipe	10000
Welded black pipe	21000
Bales ties	Closed

[1] Provided that (1) not more than 40 pct may be licensed in sizes 1 in. and under;
(2) not more than 20,000 tons may be licensed for tube rounds.

[2] Provided that 700 tons shall be of used material.

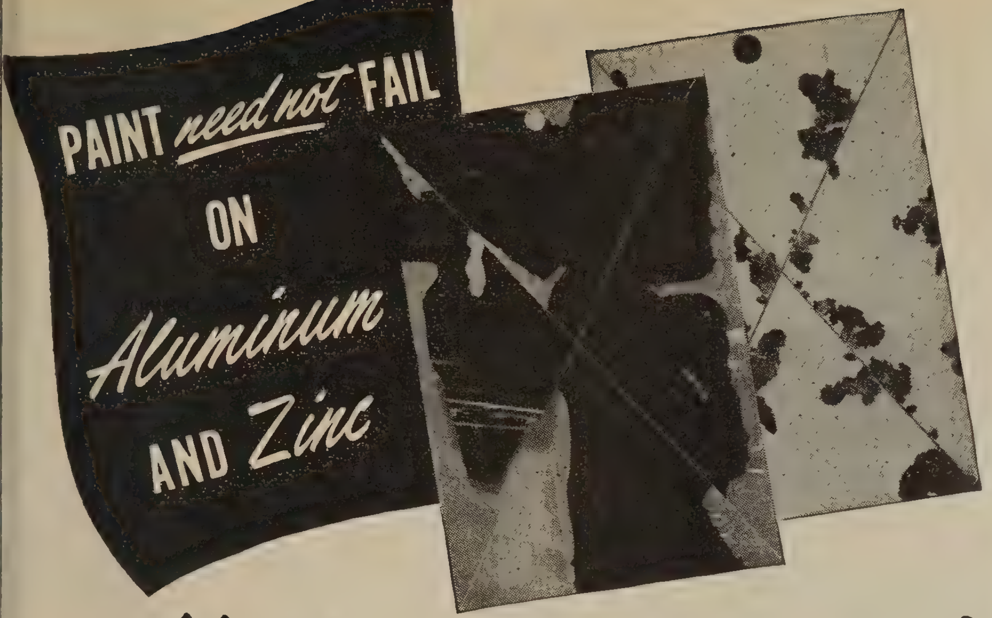
Gray Iron Society Elects Officers, Maps Program

Cleveland

• • • **At an** organizational meet
ing in Atlanta, management execu
tives of Georgia and Florida estab
lished a Southeastern group
Gray Iron Founders' Society, an
elected James W. Simmons, J
secretary-treasurer, Cox Foundry
Machine Co., Atlanta, permanen
chairman.

Olan Richardson, presiden
Southern States Equipment C
Hampton, Ga., was named vi
chairman and Malcolm W. Baldwi
president, Spalding Foundry C
Atlanta, was made secretary-trea
urer of the new organization.

Raymond L. Collier, executi



effective, economical

BONDERIZING

anchors the paint

Peeling and flaking of paint finishes on articles made from alloys of aluminum and zinc, results from improper surface preparation. To be sure of a lasting fine finish, Bonderize these metals before painting.

Aluminum and zinc surfaces acquire secure footholds for paint in the simple Bonderizing treatment. The characteristic phosphate coating serves as an anchor for the finish, since the tight, nonmetallic paint-holding crystals are integral with the metal itself. Bonderizing is also effective in retarding the formation and spread of corrosion around worn spots or accidental breaks in the finish.

Carefully designed and manufactured products of aluminum and zinc, with the finish protection of Bonderizing under the paint finish, can hold their good looks through years of service. Your products *deserve* Bonderizing.

Get full information on this Bonderizing treatment for aluminum, zinc, and their alloys. Write for technical bulletin on Bonderite 170.

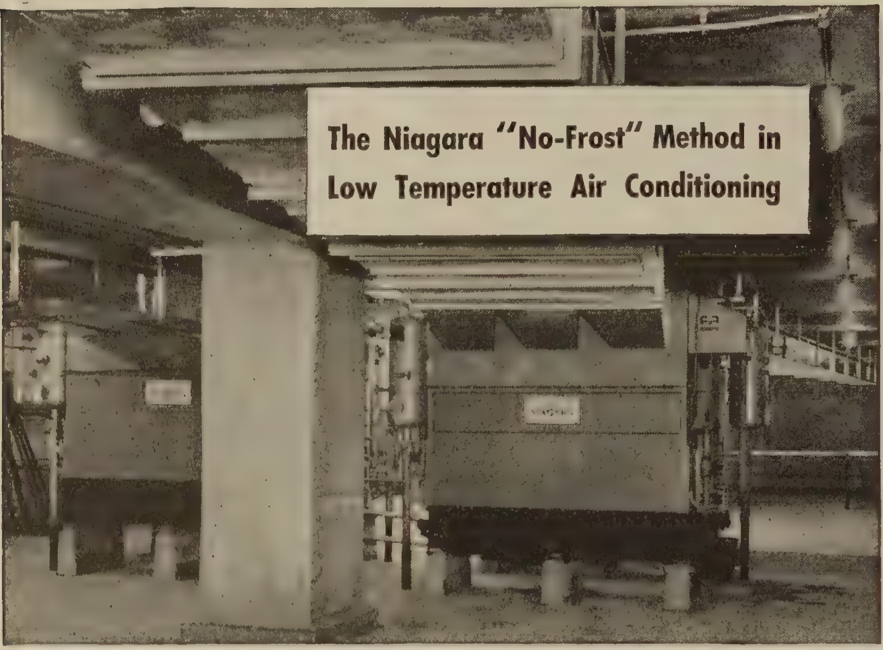
Bonderite, Parco, Parco Lubrite—Reg. U. S. Pat. Off.

PARKER

PARKER RUST PROOF COMPANY
2186 East Milwaukee Ave.
Detroit 11, Michigan

BONDERIZING Holds Paint to Metal . . . **PARKERIZING** Inhibits Rust . . . **PARCO LUBRIZING** Retards Wear on Friction Surfaces

Making or Holding Products Uniform


The Niagara "No-Frost" Method in
Low Temperature Air Conditioning

High Precision Industrial Air Conditioning with extremely dry atmospheres (or with high relative humidities) at low temperatures.

● Specializing for thirty years in the more difficult problems of air conditioning for industrial processes, this Company has developed a group of units that make it easier and less expensive for you to get the particular air conditioning benefits you may need for your special process, or to overcome some obstacle of climate or condition that is interrupting your production or causing loss from rejected parts or materials.

The Niagara "No-Frost" Method, for example, has been used to create temperatures as low as -90°F. in cold test rooms, and to provide air with only 1 gr. of moisture per lb. for special processing.

The Niagara Type "A" Air Conditioner creates any condition of temperature and humidity for a test or process, and if wanted, creates different conditions in different rooms simultaneously.

Some of the industrial applications of these units: internal combustion engines, motors and air craft, super-chargers and carburetors, gas cooling and controlled atmosphere process, film, plastics, fiber, rubber and adhesives control, biological processing such as penicillin, and yeast.

Write for a Niagara Blower Bulletin on a subject which interests you, or for the address of the nearest Niagara Field Engineer.

NIAGARA BLOWER COMPANY
Over 35 Years of Service in Industrial Air Engineering
405 Lexington Ave. New York 17, N. Y.
District Engineers in Principal Cities

INDUSTRIAL COOLING • HEATING • DRYING
NIAGARA
HUMIDIFYING • AIR ENGINEERING EQUIPMENT

vice president, Gray Iron Founders' Society, Cleveland, told the group that "the gray iron foundry industry is probably on the verge of startling new developments metallurgically. Since the war, vast strides in mechanization and modernization have been made so that the industry, as of today, can hardly be recognized as the same one with which we were familiar only a few years ago," he added.

To speed this industry improvement up-surge, the society has established a technical department under Charles O. Burgess, and is assembling the most complete technical library on gray iron to be found anywhere in the world.

Industrial Engineers Add Atomic Energy Division

New York

• • • **The H. K. Ferguson Co.**, industrial engineers and builders, have formed a new atomic energy division to specialize exclusively in nuclear engineering problems, according to Wells N. Thompson, vice-president of the company.

Dr. Karl Cohen, former director of the theoretical division of the Manhattan Project laboratory, who recently joined the Ferguson Co. will direct the activities of the new division.

Dr. William I. Thompson, a former development engineer of the Standard Oil Co. and one of the first engineers called into the Manhattan Project, will head the engineering section of the technical group.

Other personnel to form a nucleus of this group have been drawn from the engineering department of Ferguson Co.

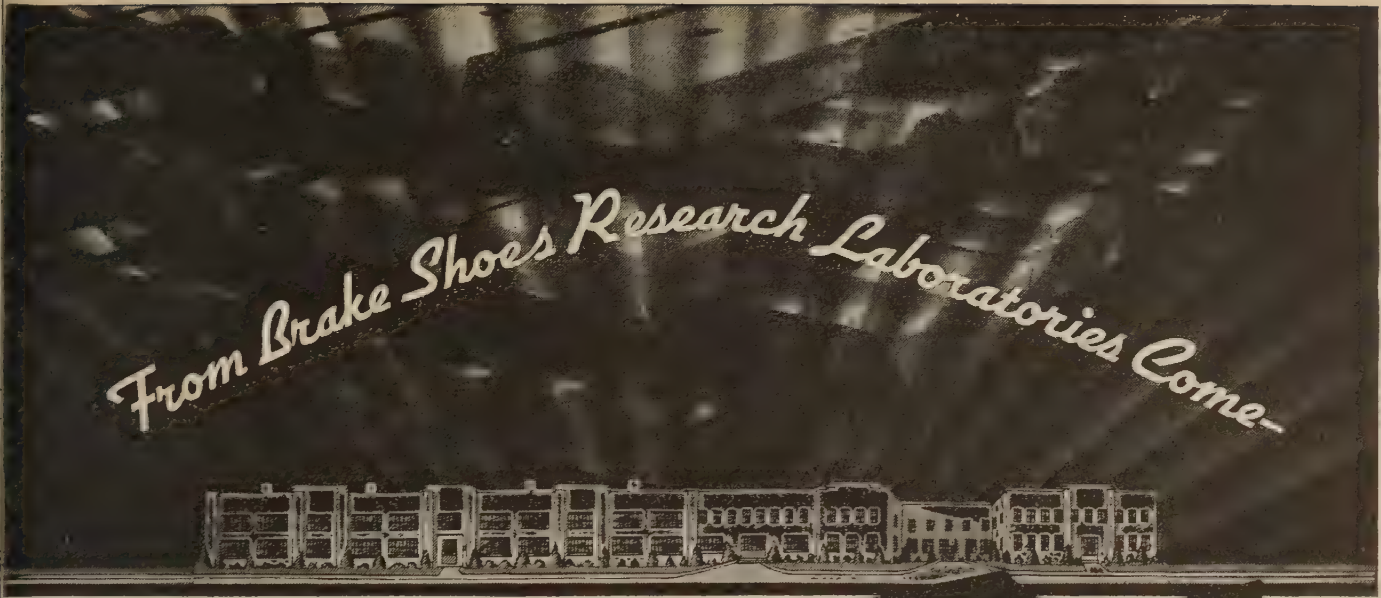
GM Cars Go Up About 8 Pct

Detroit

• • • **The automobiles** you buy from General Motors Corp. are going to cost you approximately 8 pct more than they did before July 26.

In making the announcement, Mr. C. E. Wilson, president of GM said, "We make this announcement with considerable regret, as we have made every effort to maintain prices." He added that GM was the only major automobile manufacturer that has not increased passenger car prices in recent months.

New prices of passenger cars by models will be announced by the car manufacturing divisions.



UNIFORM

QUALITY "CHROME-MOLY" STEEL Ball Mill Liners

Uniform analysis . . . uniform quality. From Brake Shoe's metallurgical and Research Department has come for the first time anywhere, a method of producing "chrome-Moly" steel ball mill liners that are the same every time. Gone is the bugaboo of unreliability—now you can depend on uniform performance.

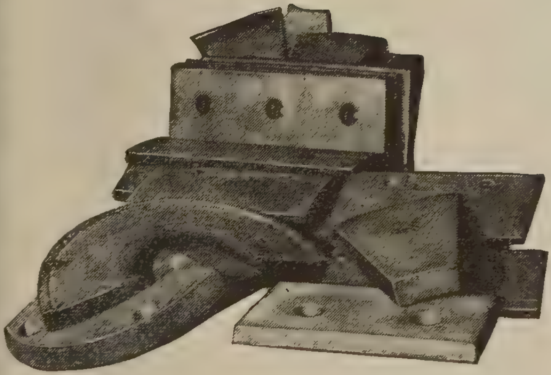
When operating conditions are such that breakage resistance is secondary to sheer abrasion resistance (plus good toughness), "chrome-moly" steel liners often show a lower cost per ton of ore milled than austenitic manganese steel. Here's a comparison of results under identical conditions in a copper mine.

	Manganese Steel	Amsco "Chrome-Moly"
Cost per Ton Ore Milled	.007529	.006839

And here's a comparison between Amsco "Chrome-Moly" liners and a competitive Chromium-Molybdenum set. In this case Amsco had the harder service of handling finer grinding.

	Competitor	Amsco "Chrome-Moly"
Cost per Ton Ore Milled	.023	.0102

Liners of austenitic Manganese Steel, chromium-manganese steel, and now "Chrome-Moly" (Chromium-molybdenum steel)—they are all part of Brake Shoe's constant effort to provide you with equipment parts of the metal best suited to your needs.



C-635. Typical shell, manhole, throat and end liners for 6′ ball mill for ore milling.

AMERICAN
Brake Shoe
COMPANY

AMERICAN MANGANESE STEEL DIVISION
CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo.
Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.

MANGANESE STEEL CASTINGS
"CHROME-MOLY" STEEL CASTINGS
HARDFACING ELECTRODES
GRINDING MILL PARTS

DIPPERS DREDGE PUMPS CRUSHER PARTS CHAINS SOLIDS PUMPS BUCKETS WHEELS

A GAUGE
A CRANE
NO SPINDLE PLAY
AND GRAND RAPIDS' MICRO-ACCURACY

A precision gauge can be only as accurate as the grinding machine used to finish-grind it. The sub-assemblies of a giant crane present an entirely different grinding problem. Whether in removing a few ten thousandths of metal in a high-accuracy operation, or in removing a lot of metal with greater allowable tolerances, freedom from spindle play is extremely important. That's just one of the reasons why you find Grand Rapids Grinders in so many leading plants of all types — from manufacturers of precision gauges to makers of huge cranes.

Other assurances of long-life accuracy and speed are: the fastest longitudinal table speed (125 f.p.m.) available in any grinder; vibrationless rigidity achieved by massive one-piece column and base casting; patented vertical head adjustment; Bijur one-shot lubricating system. *Accuracy within 0.00025 limits.

To serve you — *Your inquiry concerning your specific grinding needs will receive prompt attention. Grand Rapids Grinders include: Hydraulic Feed Surface Grinders, Universal Cutter Grinders, Hand Feed Surface Grinders, and Combination Tap and Drill Grinders.*

GALLMEYER & LIVINGSTON COMPANY

GRAND RAPIDS GRINDERS

200 STRAIGHT AVE., S.W., GRAND RAPIDS 4, MICHIGAN

High Grade
ROLLER DIES
To Form Tubes . . . .
Pipe and Cold Rolled
Shapes

Our efficient manufacturing methods assure quality, performance and lower tooling cost.

We are equipped to design and manufacture rolls of any profile or to produce any desired shape. Address all inquiries to Dept. 1 for our immediate attention.

ARDCOR

AMERICAN ROLLER DIE CORPORATION
FORMERLY NATIONAL ROLL & MACHINE COMPANY
20500 ST. CLAIR AVE. • CLEVELAND 17, OHIO

Forrestal Announces Standard Procedure On Excessive Profits

Washington

• • • **Secretary of Defense** James Forrestal in announcing the organization and procedure of the newly enacted Renegotiation Act emphasized that the new set-up would parallel the World War II operation. Mr. Forrestal directed the newly-created Military Renegotiation and Policy Review Board to follow the principles and procedures of the Renegotiation Act of Feb. 25, 1944, in prescribing standards and procedures for determining and eliminating excessive profits, having regard for the different economic conditions existing at the present time.

The directive provides for a top board, the Military Renegotiation Policy and Review Board, to be established in the Office of the Secretary of Defense and to report to him through the Munitions Board. In addition, there will be an operating board, the Armed Services Renegotiation Board, which will be a joint board of the Army, Navy, and Air Force, and will operate through divisions in each of the three departments.

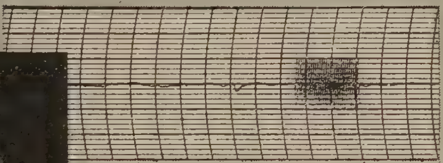
Secretary Forrestal's directive was based upon recommendations submitted to him by the Munitions Board and by an ad hoc committee composed of Under Secretary of the Navy Kenney, Under Secretary of the Air Force Barrows, and Assistant Secretary of the Army Gray. The ad hoc committee, before submitting its recommendations, conducted extensive consultations with persons who had broad experience in the field or renegotiation of military contracts in World War II.

A tentative draft of renegotiation regulations has been prepared by the ad hoc committee, but it will be some time before the regulations can be issued since members of the Military Renegotiation Policy and Review Board have not yet been named. When the board has been appointed, it will review the tentative draft of regulations, and will conduct additional discussions with industrial representatives, including industrial associations. A final draft of the regulations will then be submitted to Secretary Forrestal by the board.

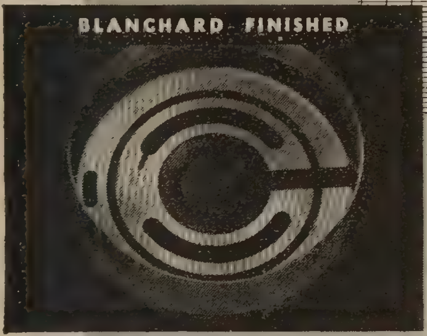
PUT IT ON THE BLANCHARD

MAKE BETTER, LONGER-LASTING PARTS WITH FINER, FLATTER SURFACES

-Eliminate Lapping!

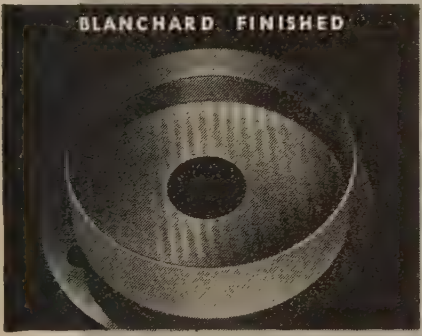


SURFACE FINISH CHART OF BLANCHARD-GROUND PIECE, USING BRUSH SURFACE ANALYZER WITH ATTENUATOR SET AT .01. SURFACE HAS ROUGHNESS VALUE OF ONLY 2 MICRO-INCHES.



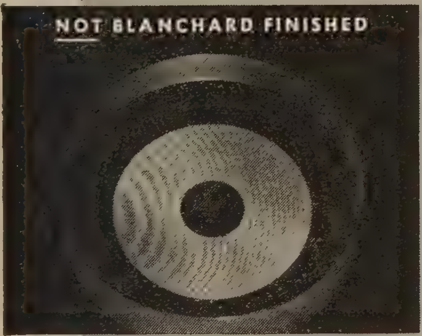
3″ Valve Plate for Hydraulic Pump. Hardened Steel.

Checking flatness of Blanchard-ground surface with optical flat. Parallel lines show surface is flat within ½ light band. (5.8 millionths of an inch.)



Cast Iron End Plate for Refrigerator Compressor.

The optical flat shows this Blanchard-ground surface flat within ½ a light band.



Checking flatness of production-lapped piece received from customer. Note the variation from flatness as shown by the curved lines.

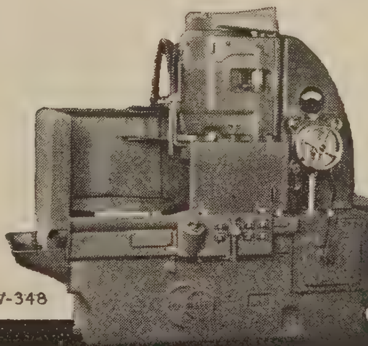
As you know, the operation of lapping charges the worked-upon surfaces with lapping grit. The presence of this lapping grit — which is practically impossible to remove — lowers the ability of the lapped surfaces to resist wear.

Blanchard research has perfected a method of flat surface grinding — using only their standard Blanchard Grinders — whereby extremely fine finishes *and* extreme flatness can now be produced in *quantity production.* The illustrations show what is being accomplished. Lapping and all other subsequent finishing operations are eliminated.

Such Blanchard-ground parts show useful life increase of up to 5 times that possible with lapped parts. Joints are tighter and withstand pressures as high as 3,000 lbs. oil per sq. in. without leaking.

If you have critical flat surfaces that require extremely fine finishes, close sizing and extreme flatness — and would like to produce them in the best and least expensive manner — it will pay you to get the advice of Blanchard engineers.

Simply send us the data, with samples if available and practical. This Blanchard Service is of course free and does not obligate you.



V-348

BLANCHARD

The **BLANCHARD** MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

To get it faster look in

SWEET'S FILE

Two hundred and fourteen manufacturers' catalogs—1,752 catalog pages—instantly accessible in the 1948 Sweet's File for the Mechanical Industries. There, right in your office, you will find up-to-date, useful and comprehensive information on forms, characteristics, performance and use of a wide range of materials, equipments and services. Manufacturers' catalogs in Sweet's File are indexed by company name, by product and by trade name, so that you can find the information you want instantly—whenever you need it . . . . .SAVE TIME—SAVE TROUBLE

LOOK IT UP IN SWEET'S

Sweet's is always working to build a bigger and better file for manufacturers' catalogs so that buyers and sellers can get together faster and at lower cost. If you would like other manufacturers to include catalogs on their products in your Sweet's File, please send us their names.

If Sweet's File for the Mechanical Industries is not available in your office, please address request for application to:

Sweet's Catalog Service
Distribution Dept.
119 West 40 St., New York 18, N.Y.

Free

to qualified organizations and individuals

Institute Fears That Americans' Inventive Genius Is Stagnating

Chicago

• • • **The** Machinery and Allied Products Institute would like to see a resurgence of inventive genius in the near future, according to a bulletin to its members who are capital goods manufacturers.

Applications for U. S. patents have taken a 15 pct nose dive since 1930. And the institute fears that technological stagnation may have overcome the country.

Over the span of years, says Mr. Kelly, president of the institute, patent applications have risen and fallen roughly with business activity. Strangely, since 1946, when the 1929 all-time high of applications was approached, there has been a steady decline.

Six factors, often advanced to explain at least part of the decline, were analyzed by the institute as;

(1) a higher standard of invention in recent years over former,

(2) adverse court decisions,

(3) fewer applications from foreigners,

(4) greater concentration of manufacturing in big companies to whom patents are relatively less important,

(5) slow response from the Patent Office, due to shortage of facilities, which may discourage dealing with it, and

(6) the innumerable hazards to formation of new small businesses to whom patents are most important.

Mr. Kelly said some of the factors may appear to discredit patent applications as technological advancement, but careful analysis confirms it.

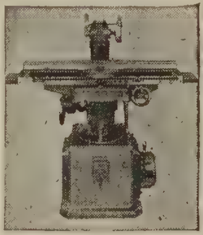
A generation ago a business minded mechanic or engineer with an idea could start a business with a patent. Today such men look at taxes, government regulations, union labor problems, financing problems and decide to remain employees.

Lukens Grants Wage Raise

Coatesville, Pa.

• • • **The United** Steelworkers of America, Locals 1195 and 2265, and Lukens Steel Co. reached an agreement where the employees of the company will receive wage increases on a sliding scale from 9½

LeBlond No. 2 can be operated sitting or standing, from front or rear.



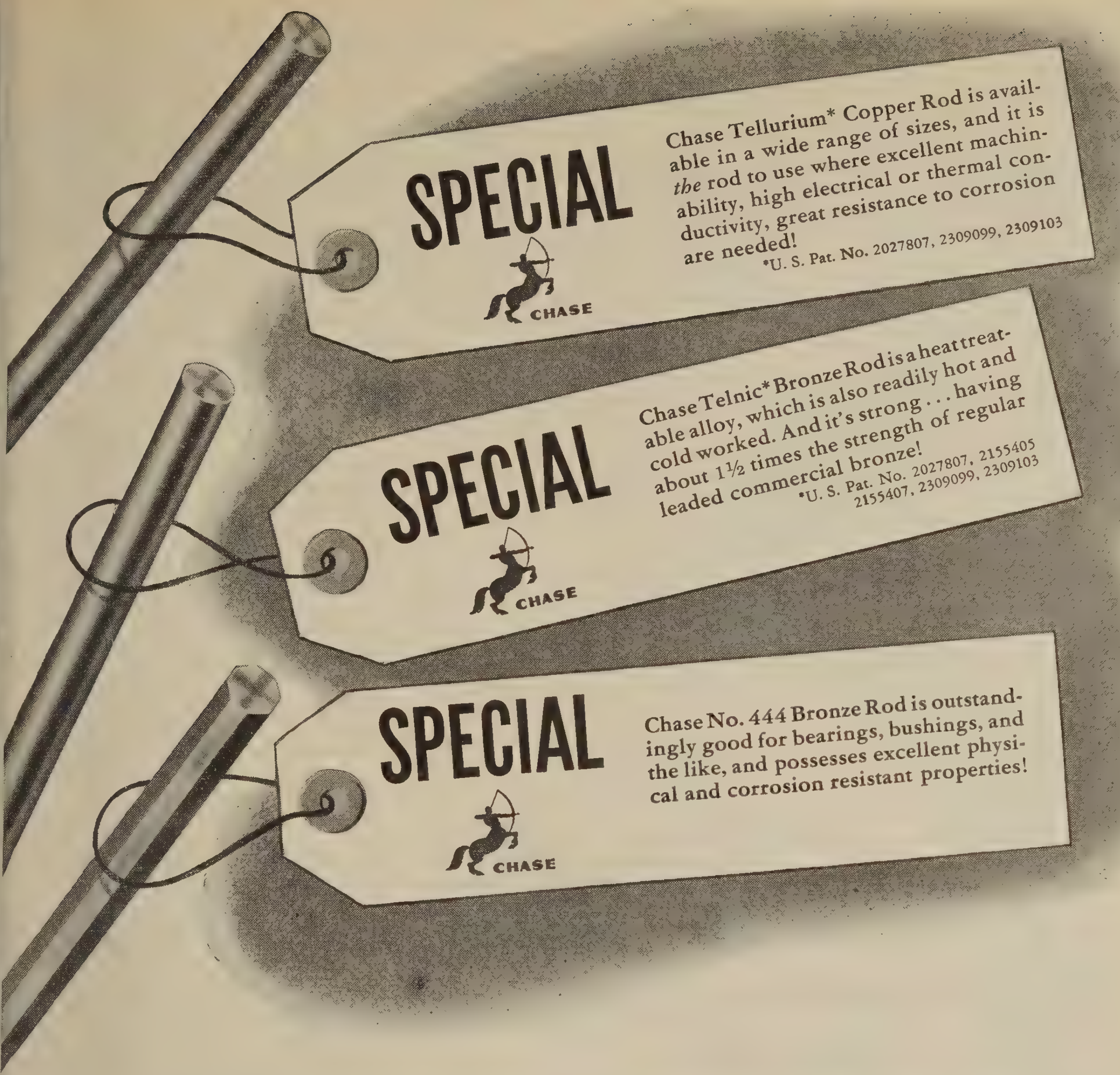
Stationary Wheel Head

FLEXIBILITY OF MOVEMENT IMPORTANT IN CUTTER GRINDER

The ability of the LeBlond No. 2 Cutter Grinder to deliver four different speeds from any angle makes it an important asset for tool rooms. It can be operated from a sitting or standing position, from front or rear, and may be swung around to the precise angle required.

The LeBlond No. 2 is the only Cutter Grinder that provides four speeds — 6500, 5100, 4000, and 3100 rpm — easily and quickly, thanks to the stationary wheel head design. It grinds an almost unlimited variety of reamers, mills, taps, and cutters. Costwise, as well as from a general efficiency standpoint, the LeBlond No. 2 is without comparison. The sliding table is mounted on double roller bearings, and the swivel table has three milled slots — two angular, one straight — to position table attachments correctly.

For help on any grinding operation, or for complete details of the LeBlond No. 2 Cutter Grinder, contact your nearest LeBlond distributor, or write The R. K. LeBlond Machine Tool Company, Cincinnati 8, Ohio.



Chase Tellurium* Copper Rod is available in a wide range of sizes, and it is *the* rod to use where excellent machinability, high electrical or thermal conductivity, great resistance to corrosion are needed!

*U. S. Pat. No. 2027807, 2309099, 2309103

Chase Telnic* Bronze Rod is a heat treatable alloy, which is also readily hot and cold worked. And it's strong . . . having about 1½ times the strength of regular leaded commercial bronze!

*U. S. Pat. No. 2027807, 2155405
2155407, 2309099, 2309103

Chase No. 444 Bronze Rod is outstandingly good for bearings, bushings, and the like, and possesses excellent physical and corrosion resistant properties!

For those tough jobs...3 Chase Special Alloy Rods

. . . *made to see you through*

THESE three special rod alloys were specifically developed to meet certain unusual needs of industry. They were designed to help solve manufacturing problems that *you* may encounter. They typify the kind of service Chase is prepared to offer you.

In addition to these special alloys, Chase *regularly produces*—in rod—10 non-leaded alloys, 7 leaded alloys of the highest quality . . . making it the simplest thing in the world to obtain one or more rod alloys that will do exactly the job you require. Start now to draw upon this wealth of production and research facilities. Call Chase today!

Chase *the Nation's Headquarters for*
BRASS & COPPER

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SUBSIDIARY OF KENNECOTT COPPER CORPORATION

THIS IS THE CHASE NETWORK . . . *handiest way to buy brass*

ALBANY† ATLANTA BALTIMORE BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT HOUSTON† INDIANAPOLIS KANSAS CITY, MO. LOS ANGELES MILWAUKEE MINNEAPOLIS NEWARK NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH PROVIDENCE ROCHESTER† SAN FRANCISCO SEATTLE ST. LOUIS WATERBURY (†Indicates Sales Office Only) to 22c per hour, according to Robert W. Wolcott, president of Lukens.

An equivalent increase will be granted to salaried employees whose individual earnings are less than $7500 a year. Salaried employees making more than this amount will be considered on an individual basis.

All wage increases are retroactive to July 18.

The collective bargaining agreement of May 16, 1948 and the provisions of the supplemental agreement will remain in effect until May 16, 1950. Also provided is that 60 days prior to July 18, 1949, either party may serve notice on the other of its desire to negotiate on wages or insurance benefits.

AEC Report Details Uses of Radioactive Isotopes in Industry

Washington

• • • **Devoting the** bulk of its fourth semiannual report to the work being done with isotopes produced at Oak Ridge, Tenn., the Atomic Energy Commission reveals a wide use of radioisotopes in practically every field of scientific endeavor. From June 1, 1946 to June 30, 1948, AEC figures show that 1010 projects involved the use of radioisotopes—of these 83 were in industrial research, 14 in metallurgy, 171 in chemistry and 193 in physics. Medical research accounts for more than 40 pct of all uses.

As to atomic power, the Commission's General Advisory Committee reports that "even on the assumption of a most favorable and repaid technical development a word of caution is needed as to the time scale. We do not see how it would be possible under the most favorable circumstances to have any considerable portion of the present power supply of the world replaced by nuclear fuel before the expiration of 20 years.

"Two reactors are now authorized for construction which should produce atomic power and which should be completed within the next 2 or 3 years. Neither unit can conceivably rate as an economic producer of power. But, as a result of experience gained in these, and their successors, there will start a program of reaching higher temperatures and at the same time satisfying some of the criteria necessary for practicality and economy. Fairly practical reactors, that might be useful for special purposes, may then be available on an experimental basis within a decade."

Much experience is also being gained from existing "nuclear reactors which produce atomic power as a byproduct but not in a useable form."

Regarding tracer applications in metallurgy, the report declares that the entire field of metallurgy is certain to be greatly influenced by tracer investigations already under way on the structure, manufacture, alloying, durability, corrosion, and friction of metals. The Industrial Radiography Laboratory in Beaumont, Texas, Arthur D. Little, Inc., Massachusetts Institute of Technology, Socony-Vacuum Oil Co., Stevens Institute of Technology, and Westinghouse Electric Corp.—all report projects in this field; and the radioisotopes of more than a dozen elements are being used, including iron, calcium, carbon, sulfur, phosphorus, cobalt, silver, nickel, tungsten, copper, and zinc. In metallurgy alone there are dozens of other users of radioactive isotopes; scores more are on the general industrial list.

The power of these new investigative tools makes them extremely versatile. A tiny quantity of radiosulfur, for example, added to 24,198 lb of mixed coal, enabled investigators to determine later what proportion of the sulfur impurities in the finished steel came from the coke and what proportion came from the iron. Radiophosphorus, added to a molten batch of steel, joins with the phosphorus already present and therafter, by its radiations, reveals the quantity of this impurity that still remains in the mix at various stages of processing. Radiocarbon, incorporated into iron during the coking process, provides investigators with a method of studying the diffusion of carbon in iron, a matter of great importance in the subsequent manufacture of steel. Radioiron, used in friction experiments, has been able to reveal the transfer of less than one hundred-billionth of an ounce of metal from one moving surface to another. Piston rings and other motor parts have been made radioactive in the Oak Ridge pile for use in these latter studies.

For Safe and Economical Results, Use . . .

-Preformed-

"HERCULES" (RED-STRAND) WIRE ROPE

The experience of many wire rope users has proved that they can depend on Preformed "Hercules" (Red-Strand) Wire Rope for top-flight performance. Its easy handling . . . its smooth spooling . . . its unusual endurance—make for faster work, longer life and lower operating cost.

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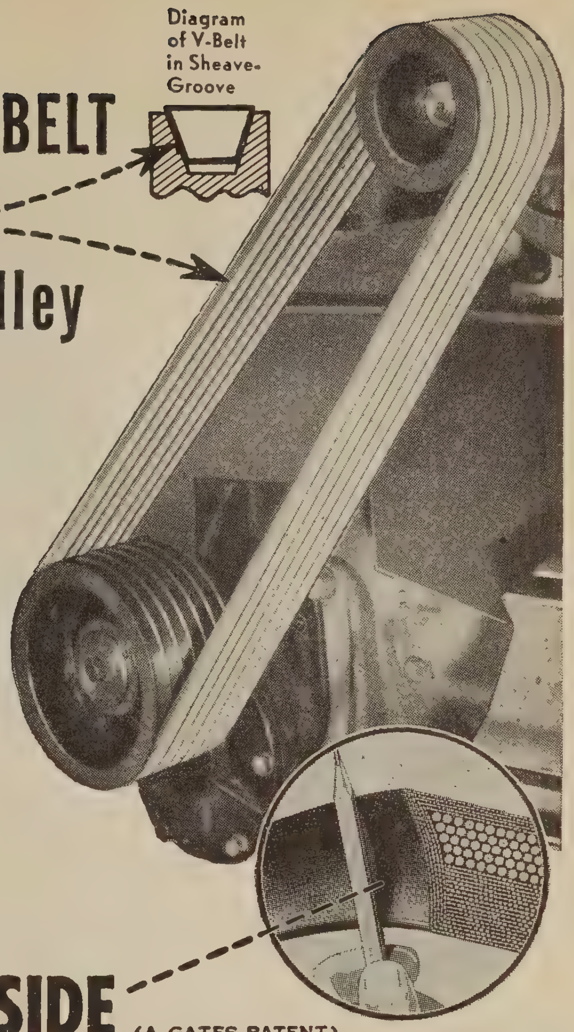
The **SIDE** of a V-BELT
is what GRIPS the pulley



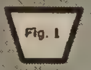
Naturally,
it GETS the WEAR!

Any one familiar with V-Belt drives knows that the sides of a V-Belt are what really get the wear.

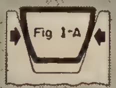
It's the *sides* that grip the pulley. They *pick up* all the power from the driver pulley, *transmit* that power to the belt as a whole and then, once more, they *deliver* the power to the driven pulley. And, clearly, it's the *sides*—and *only* the sides—that take the wear against the sheave-groove wall.

That is why you have always noticed that the *sidewall* of the *ordinary* V-Belt is the part that *wears out first*—and, naturally, if you prolong the life of the sidewall, you *lengthen* the *life* of the *belt!*

Now See How the CONCAVE SIDE (A GATES PATENT) SAVES Sidewall Wear and Lengthens Belt Life!

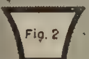


Straight Sided V-Belt

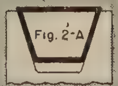


How Straight Sided V-Belt Bulges When Bending Around Its Pulley

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.



Gates V-Belt with Patented Concave Sidewall



Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley

No Bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the side-wall—and that means much longer life for the belt!

The simple diagrams on the left show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the *middle* of the sides. The diagrams show also why the Patented Concave Side greatly *lengthens the life* of the *sidewalls* of Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belt can possibly give.

Saving SIDEWALL WEAR is more important NOW than ever before. ..

Now that Gates *SPECIALIZED* Research has resulted in Super Vulco Ropes capable of carrying much heavier loads—fully 40% higher horsepower ratings—the sidewall of the belt is called upon to do even more work in transmitting these heavier loads to the pulley. Naturally, with heavier loading on the sidewall, the life-prolonging Concave Side is more important now than ever before!

THE MARK OF
SPECIALIZED RESEARCH

THE GATES RUBBER COMPANY Denver, U. S. A.
"The World's Largest Makers of V-Belts"

487

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Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

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To the Steel Industry's Big Show held only every two years.

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"What's new" in equipment, supplies and services, of over 150 manufacturers.

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A complete technical program covering all phases of steel mill operation and production. Outstanding authorities will present papers.

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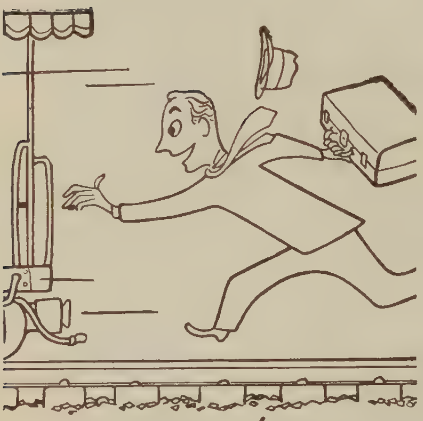
In the four days of the Iron and Steel Exposition you can *learn* of all the latest developments in the industry, through the displays and technical sessions.

Don't miss it!

You don't have to be an engineer—every steel man is invited



You still have time to make the

1948 IRON & STEEL EXPOSITION

CLEVELAND PUBLIC AUDITORIUM
CLEVELAND, OHIO
Sept. 28, 29, 30, Oct. 1, 1948

sponsored by
ASSOCIATION OF IRON & STEEL ENGINEERS
1010 Empire Building, Pittsburgh, Pa.
ATlantic 6323

Steel Executives to Help ASM President At Metals Congress

Cleveland

• • • **Presidents of** 8 national associations in the alloy steel consuming field and the presidents of the 3 largest steel producing companies, have accepted appointments from American Society for Metals to serve with the society's president, Francis B. Foley, and the society's vice president, Harold K. Work, on the honorary committee covering the "Salute to Alloy Steel", central theme of the National Metal Congress and Exposition, which meets in Philadelphia, Oct. 25 to 29, 1948.

Association presidents on the honorary committee are: for aircraft, Oliver P. Echols, Aircraft Industries Association of America; the automotive industry is represented by George W. Mason, Automobile Manufacturers Association; electrical equipment industry, William C. Johnson, NEMA; farm equipment manufacturers represented by J. H. Oppenheim, Farm Equipment Institute; machine tool field represented by A. G. Bryant, National Machine Tool Builders Association; for petroleum, William R. Boyd, Jr., American Petroleum Institute; William T. Faricy, Association of American Railroads, representing the railroads and Walter S. Tower, president, American Iron & Steel Institute, representing all alloy steel producers.

Serving for the three major alloy steel producers are their presidents: Benjamin F. Fairless, U. S. Steel Corp., A. B. Homer, Bethlehem Steel Co., and C. M. White, Republic Steel Corp.

Portsmouth Steel Sales Up

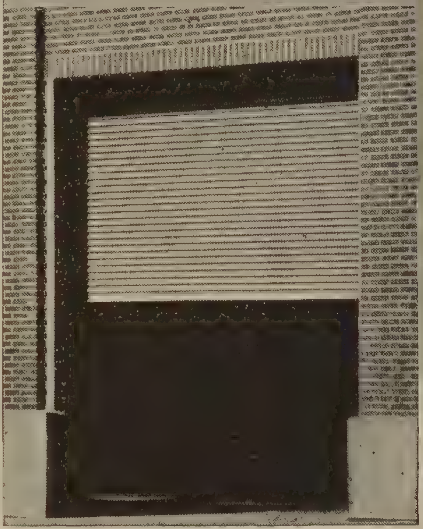
Portsmouth, Ohio

• • • **Portsmouth Steel Corp.** has reported net earnings for the first 6 months of 1948 amounting to $1,933,460, or $1.50 per share on the shares of common stock now outstanding. Sales for the same period were $27,558,832, compared with $23,201,084 in the first half of 1947.

Net current assets as of June 30, 1948, plus investments in listed securities, amounted to $11,098,428, or $8.67 per share.

Portsmouth anticipates capacity production during the remainder of the year, Mr. Schwartz said. On

How's Your Door I.Q.?



Q. Why UPWARD ACTION?

A. Only upward-acting doors give you full use, at all times, of all floor and wall space around entrances. They open completely out of the way, safe from wind damage, beyond reach of trucks or other vehicles.

Q. Why INTERLOCKING-SLAT DESIGN?

A. Kinnear's rugged, free-acting, interlocking-slat curtain *coils* into a small space above the door lintel—and can even be concealed in the wall in many cases.

Q. Why ALL-METAL CONSTRUCTION?

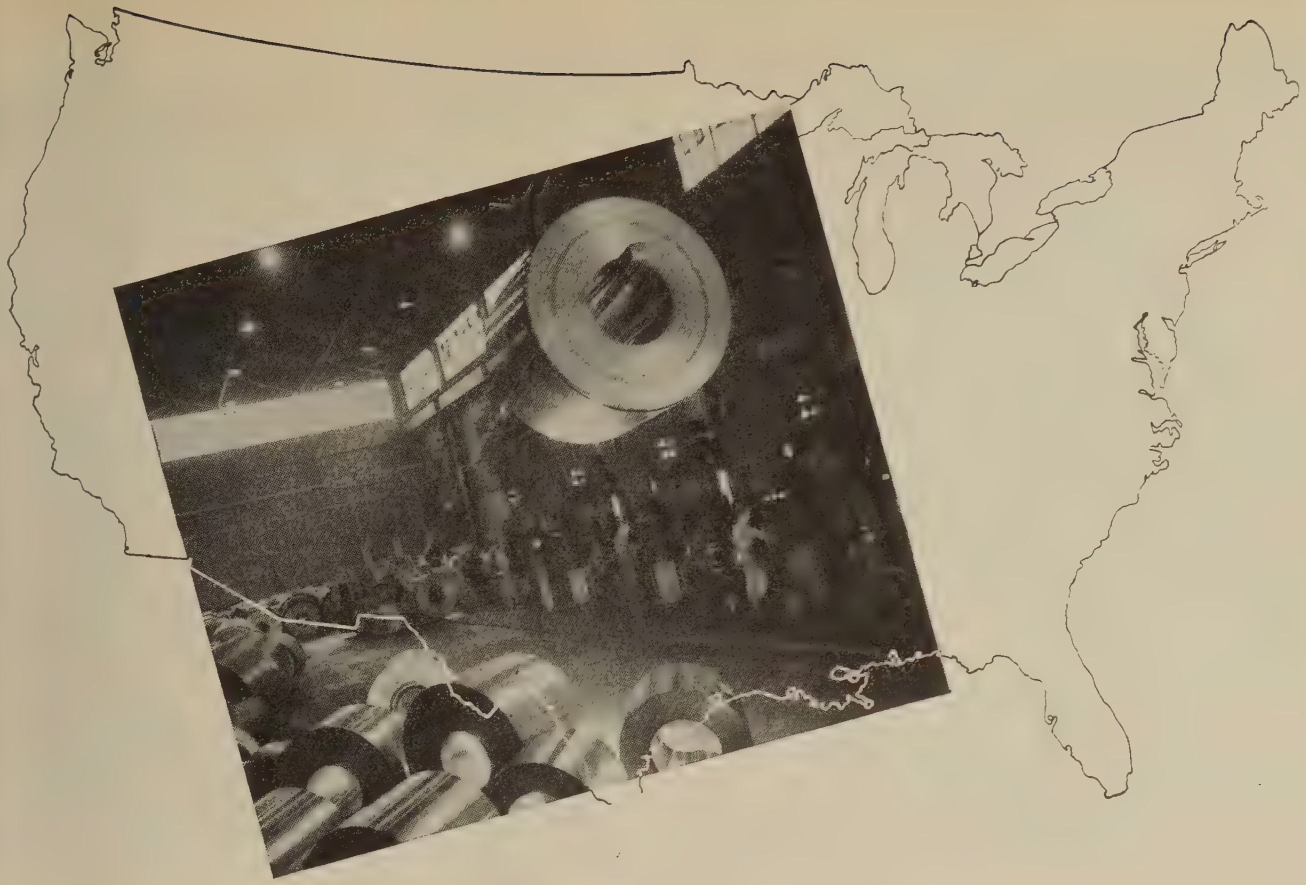
A. Higher protection . . . greater fire-resistance . . . longer life with less maintenance. Kinnear's steel-slat curtain features strength *plus flexibility—it absorbs many shocks and blows* that damage other types of doors.

Q. Why KINNEAR STEEL ROLLING DOORS?

A. For half a century, KINNEAR has combined all the above door advantages, providing highest efficiency at lowest cost to industrial and commercial users of every type. Kinnear Rolling Doors are available any size, for old or new buildings, with motor, manual or mechanical operation. Write today for complete information.

THE KINNEAR MANUFACTURING CO.
Factories:
1760-80 Fields Avenue, Columbus 16, Ohio
1742 Yosemite Avenue, San Francisco 24, Cal.
Offices and Agents in Principal Cities

SAVING WAYS in DOORWAYS
Saving Ways in Doorways
KINNEAR ROLLING DOORS



Here's why...

Since 1878 hundreds of manufacturers in Middle America have specified "Steel from Granite City." Here's why: Granite City steel is of the finest quality, tailor-made to specific requirements. Granite City's central location in the heart of Middle America offers a distinct shipping advantage.

The facilities of Granite City Steel Company have always been large enough to utilize the newest processes of the steel industry . . . yet small enough to pay strict attention to minute details of manufacture that mean finer quality steel.

Coils
Cold Rolled Sheets
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Porcelain Enameling Sheets
Electrolytic Tin Plate
Hot-Dipped Tin Plate
Fabricated Products
Stainless-Clad Sheets & Plates
Strongbarn Galvanized Roofing

SINCE
GRANITE CITY STEEL
1878

Granite City Steel Co.
Granite City, Illinois
Dallas
Kansas City
Memphis
Minneapolis
Moline
St Louis

Granite City is the main supplier of steel for Middle America

ASM Dedicates Memorial Room to Dr. Sauveur, a Pioneer in Metallurgy

Cleveland

• • • **Dedication** of a memorial room to the late Dr. Albert Sauveur, pioneer in the science of metals, will take place here in the national offices of American Society for Metals, Aug. 19, according to W. H. Eisenman, the society's national secretary.

Dr. Sauveur was Gordan McKay Professor of Mining and Metallurgy at Harvard when he died in 1939.

The memorial room, which occupies a space 40 by 15 feet, has been completely redecorated and equipped with built-in glass-enclosed cases for displaying the many records and honors belonging to Dr. Sauveur. Dominating the room will be an oil painting of the scientist, executed by Alexander Smith, outstanding portrait artist. Prof. Sauveur's desk and chair, his medals, awards and other memorabilia will be on display.

Other items of historic interest, not connected with Prof. Sauveur, will be an early Rockwell hardness testing machine, a complete set of the writings of the late Dr. John A. Mathews, and many photographs and letters of other honorary members and winners of the ASM Sauveur Achievement Award, of which Dr. Sauveur was the inspiration and first recipient.

Dedication ceremonies will be attended by the national officers and trustees of the society, by Mrs. Sauveur, widow of the noted metallurgist, and by any members of the American Society for Metals who would like to attend. Dr. Sauveur was an honorary member of the society.

Chairman of the committee responsible for the memorial room is H. H. Lester of Watertown Arsenal. Other members who, with Dr. Lester, were former pupils of Dr. Sauveur, include G. B. Waterhouse of MIT; V. N. Krivobok, International Nickel Co.; Joseph Winlock, Edward G. Budd Mfg. Co.; James P. Gill, Vanadium Alloys Steel Co.; Bradley Stoughton, Lehigh University; and W. H. Eisenman.

Share $4 Million in Wage Distribution Adjustment

Youngstown

• • • **Approximately** 21,000 present employees and severa thousand former employees o Youngstown Sheet & Tube Co. in Youngstown and Chicago districts shared in a $4 million distribution of wage adjustments July 28.

Present employees received their adjustment check along with regular pay checks. Former employees have 120 days to file request for payments and will receive their checks by mail.

This was the second and final payment under a War Labor Board directive issued Nov. 25, 1944, and covers the period from Dec. 25, 1943 to March 31, 1947. Payments for the period from April 1, 1947 to Feb. 1, 1948 were distributed May 5.

The Youngstown Sheet & Tube Co. and its subsidiary, Youngstown Metal Products Co., employ about 14,000 production and maintenance workers in the Youngstown district while about 7000 are employed by Youngstown Sheet & Tube in the Chicago area.

The inequity agreement under which these payments are being made provides that:

Retroactive payments shall be made to eligible employees who are on the plant payroll on the date of disbursement and to former eligible employees who are not on the plant payroll on that date provided such former employees file individually signed requests therefor in writing with the company within 120 days from the date of disbursement."

Willy-Overland Net

Toledo

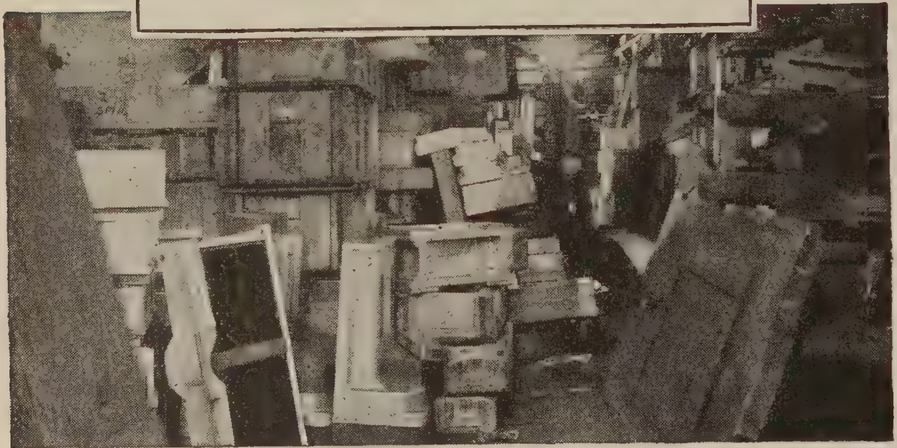
• • • **Net earnings** for nine-months ended June 30 for Willys-Overland Motors totaled $5,216,964, an increase of 124 pct over the previous year.

Earned net profit is equivalent tc $1.75 per share on a nine-months basis after allowance for preferred dividends.

The company produced 36,916 vehicles during the third quarter compared with 31,393 vehicles for the same period a year ago.

Willys-Overland is currently introducing to the public its new sport phaeton, the Jeepster. A development from the wartime Jeep the Jeepster features functional styling and economical operation

A FORTUNE IN PATTERNS



This is one of our storage sections. *Strenes Metal* castings have been made from these patterns.

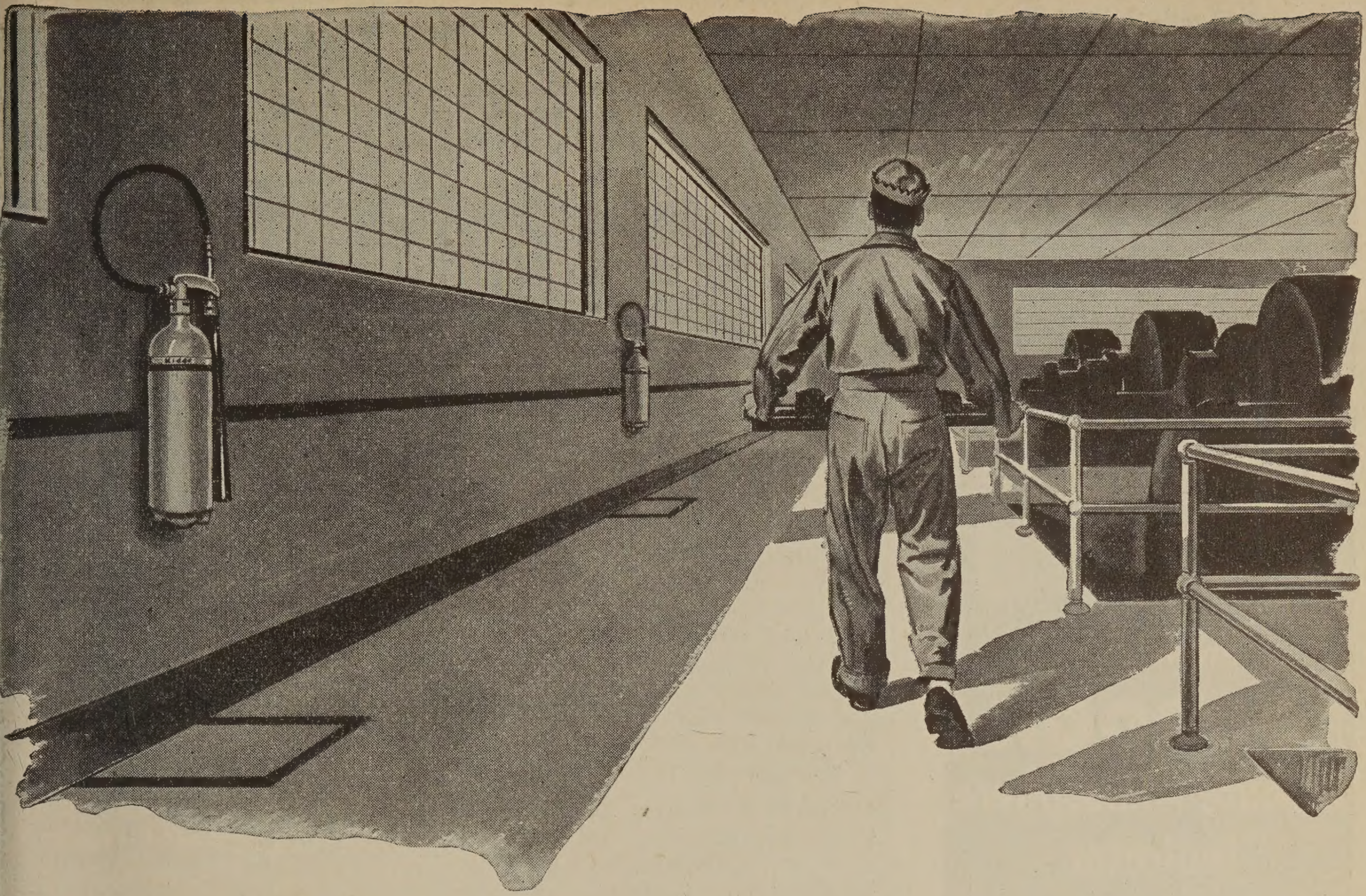
Here are patterns for forming and drawing dies used by many of the largest sheet metal fabricators . . . manufacturers of appliances, automobiles, bicycles, blowers, caskets, implements, tractors, trucks, vaults, etc.

Here are also patterns for *Strenes Metal* castings employed as parts of equipment . . . bushings, melting pots, pump housings and impellers, lathe beds, machine bases and the like.

When you visit our plant, you'll probably be surprised at the volume of *Strenes Metal* castings we pour from day to day.

Strenes Metal
DRAWING AND FORMING DIES

THE ADVANCE FOUNDRY COMPANY
100 SEMINARY AVENUE—DAYTON 3, OHIO



You may have *plenty* of extinguishers... BUT are you *sure* they're ready for action?

Periodic inspection and maintenance, recharging when necessary... these steps are essential to keep your fire extinguishers ready for *immediate* action.

Perhaps this involves a serious drain on the time of your personnel—who may be urgently needed for productive tasks. If so, here's a suggestion.

Why not let your Kidde representative take on the job?

He is prepared to offer you, on an annual contract basis, a comprehensive service covering all phases of fire-extinguisher service. He will call at regular intervals, to check the condition of your equipment, and will let you know immediately when recharging and repairs are needed. He has full facilities for the actual handling of the recharging or repairs.

Such an arrangement can help you, in other ways, to make most effective use of your fire extinguishers. As a specialist in fire-fighting, your Kidde representative may be able to *locate* your extinguishers to better advantage. Perhaps one extinguisher is hard to reach. Perhaps two types of extinguishers would give better protection if their positions were interchanged. You'll find such a service well worthwhile—why not look into it?

WALTER KIDDE & COMPANY, INC. **850 MAIN STREET, BELLEVILLE 9, N. J.**

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FIRE EXTINGUISHING EQUIPMENT
FIRE DETECTION DEVICES
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MANUFACTURING
ENGINEERS

VALVES, CYLINDERS, SPHERES
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OIL HEAT TRANSFER UNITS

Correct ? Furnace Atmosphere

GORDON FURNACE ATMOSPHERE INDICATOR
You'll Always Know with a
GORDON
Furnace Atmosphere Indicator

Do you depend upon badly scaled or decarburized work to tell you that something has happened to your furnace atmosphere? And then spoil more work getting the atmosphere back to where it belongs?

A Gordon Furnace Atmosphere Indicator will watch that for you. It makes a continuous, thorough check of the furnace atmosphere, and as soon as it changes, the change is detected and indicated so that quick necessary adjustment can be made. It works on gas or oil-fired furnaces and in protective atmospheres on electric furnaces.

The Gordon Furnace Atmosphere Indicator works on the principle of the relative thermal conductivity of gases. It is so simple and easy to use that top results can be obtained with shop or non-technical personnel.

Where a continuous record of atmosphere readings is required, the indicator can be co-ordinated with a recorder.

You can't afford to be without this instrument any longer.

Price, complete with U-tube and Sample Filter, 110 V, 60 C, **$335.00**

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PERSONALS

(Continued from p. 112)

- **Berle Ludwig** has been appointed general superintendent, Kerrigan Iron Works, Nashville, Tenn. Mr. Ludwig was formerly shipyards superintendent in Mobile.

- **C. J. Gaspar** has resigned as assistant general sales manager of Nichols Wire & Aluminum Co. and has joined the DeBothezat Fans Div., American Machine & Metals Co., Inc., East Moline, Ill., as sales manager.

- **E. G. Knox** has been appointed assistant sales manager, Ditzler Color Div., Pittsburgh Plate Glass Co., Detroit. Mr. Knox has been with the Ditzler Div. over fourteen years.

- **William M. Walworth** has been named chief engineer of Reo Motors, Inc., Lansing, Mich., succeeding **Karl K. Probst**, who has resigned to enter the consulting and development field. Mr. Walworth joined Reo in 1927 and was later named vice-president and chief engineer of Mack Trucks, Inc.

- **George P. Hooper, Sr.** has been appointed manager of Restfoam sales, Hewitt-Robins Inc., with his headquarters in Buffalo. He has been Detroit representative of the company since 1945.

- **J. C. H. Stearns** has been appointed manager of ingot sales; **G. W. DeKuiper** has been named manager of wrought product sales and **T. H. Caldwell, Jr.**, manager of die castings sales, Magnesium Div., Dow Chemical Co., Midland. Mich. **J. C. Mathes**, formerly director of technical service, has been made western sales manager and **Dr. J. C. McDonald** has assumed responsibility for the technical service department. **E. H. Killheffer** has been named manager of the eastern area for magnesium sales.

- **Jesse J. Crimmins** has been appointed director of traffic, Studebaker Corp., South Bend, Ind., succeeding **Glenn E. Welch**, who has retired. **George O. Linville** has been named master mechanic, succeeding **Lorin R. Runkle**. Mr. Crimmins has been associated with the corporation since 1919. In 1939 he was named assistant director of traffic. Mr. Linville joined Studebaker's tool and die department in 1915. He was later named foreman of the forge division.

- **Dr. Morris Steinberg** has been appointed to the Metallurgy Dept. of Horizons, Inc., Cleveland. **Dr. Alexis G. Pincus** has been named to head the Ceramics Dept. and **Ed-**

FASTER, SAFER

HOT METAL STAMPING

WITH *Pannier* "MASTER MARKER" SINGLE STROKE PNEUMATIC MARKERS

ANOTHER
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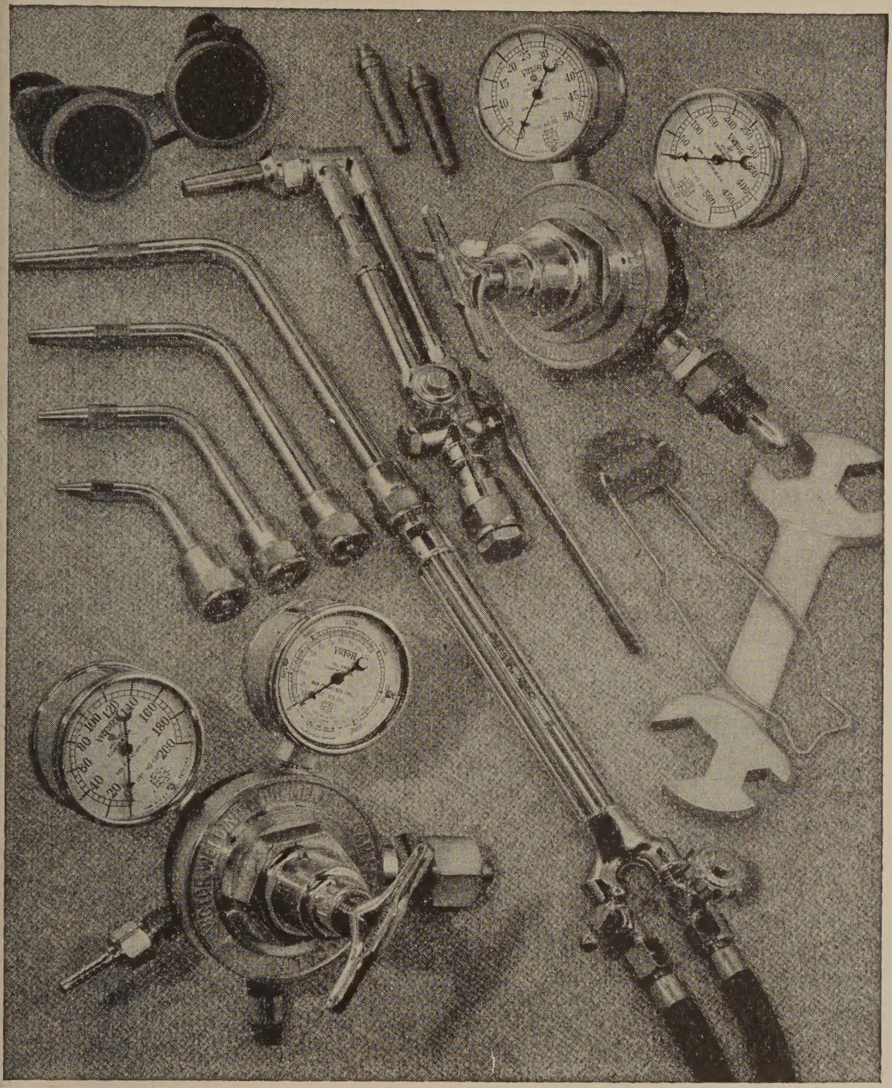

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ward F. Mayer has been appointed to the Physics Dept.

• **Orville C. Hoover** has been appointed superintendent of the new plant for Wysong & Myles Co., Greensboro, N. C. Mr. Hoover has spent 30 years in the foundry field.

• **M. W. Rowell** has been named representative in Washington, D. C. for Service Caster & Truck Corp. of Albion, Mich. and Somerville, Mass.

• **Leland W. Mosher** has been elected an assistant secretary of the General Electric Co., Schenectady. He will retain his present position as manager of the G. E. Insurance Div.

• **J. E. Crotty** has been appointed sales engineer for Aetna-Standard Engineering Co., Youngstown. Mr. Crotty was formerly manager of the wire department of Manganese Steel Forge Co.

• **Russell M. Hart** has been named public relations director of the southeast region for Ford Motor Co., with his headquarters in Chester, Pa.

• **B. A. Best** has been elected a member of the board of Dearborn Motors Corp., Detroit, succeeding Albert J. Browning, who died recently. Mr. Best is secretary-treasurer and controller of the corporation. **G. D. Andrews** has been appointed assistant general sales manager of Dearborn and **James F. Pedder** has been named advertising and sales promotion manager. Mr. Andrews was formerly associated with Celotex Corp. and Mr. Pedder was director of employee information for General Motors Corp.

• **Ellis H. Geiselman** has joined the administrative planning staff of Willys-Overland Motors, Toledo. Captain Geiselman comes to Willys-Overland after 31 years commissioned service in the U. S. Navy. **J. S. Connant, G. R. Cheetham** and **M. P. Williams** have been appointed purchasing agents for the productive materials group of the reorganized procuremet division of Willys-Overland. **I. A. Degner** and **H. W. Fels** have been named purchasing agents in the non-productive materials group of that division.

• **W. M. Ball, Jr.** has become associated with the technical staff of R. Lavin & Sons, Inc., Chicago, as metallurgist and foundry consultant. Mr. Ball was formerly associated with the Magnus Brass Div. National Lead Co.

• **Jerome B. Magee** has been appointed district sales manager in charge of steel boiler sales in western New York for Farrar & Trefts Inc., Buffalo. **Donald F. Baumler** has been named to direct sales of fabricated steel and alloy plate work.

• **Edward A. Halbleib** has retired as general manager of Delco Appliance Div., General Motors Corp., Rochester, N. Y. after nearly 40 years with the division and its predecessors. **Paul H. Rutherford** has been appointed to succeed Mr. Halbleib. Mr. Rutherford joined the corporation in 1926 and has served as assistant general manager of the Delco Appliance Div. since 1947.

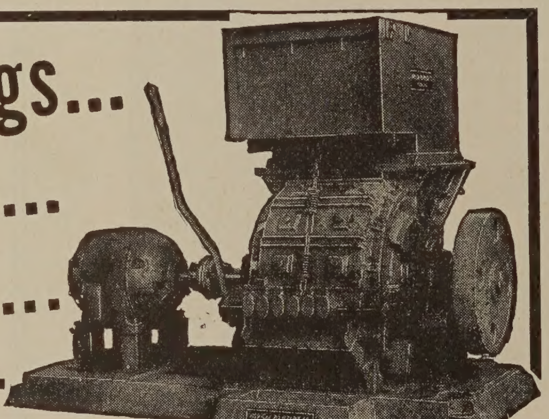
• **George J. Fischer** has been named manager of national accounts of the Industrial Products Sales Div., B. F. Goodrich Co., Akron. **James M. Flounders** has been appointed to succeed Mr. Fischer as product manager. Mr. Fischer joined the company in 1934 and has been in the industrial products sales division eight years, two of which he spent as division operating manager. Mr. Flounders joined the company in 1939 as a construction engineer and has been in technical development in hose sales since 1944.

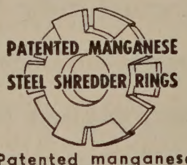
• **John H. Bartol** has joined the W. B. Connor Engineering Corp., New York, as director of the Air Recovery Div. Mr. Bartol was formerly connected with American Air Lines.

• **Raymond S. Earhart** has been named operating manager of the chemical division of Goodyear Tire & Rubber Co., Akron. **Robert S. Sanders** has been appointed manager of Pliobond Sales.

• **Howard B. Steggall,** vice-president in charge of Pacific Steel Boiler Div., U. S. Radiator Corp., Detroit, has been elected a director of that corporation, succeeding **Carroll M. Baumgardner,** who has resigned as director and executive vice-president. **Victor W. Blackney** has been named director of sales of the corporation.

• **C. F. Cotton** has been named western representative for sales and service, Baird Associates, Inc., Cambridge, Mass. Mr. Cotton was formerly engaged in aeronautical and other engineering work for the U. S. Navy.





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